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1901-1902

Second Biennial Report

OF THE

Montana State Board

OF

HORTICULTURE

1901-1902

Independent Publishing Co., Official State Printers and Binders
Helena, Montana



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Second Biennial Report

of the

MONTANA STATE BOARD OF

Horticulture

to the

Legislative Assembly

of the

STATE OF MONTANA

For the years

1901-1902

Independent Publishing Company, Official State Printers and Binders
Helena, Montana





OFFICERS AND MEMBERS OF THE BOARD.

Olney Taylor, First District, Park City.
E. N. Brandegee, President, Second District, Helena.
C. H. Campbell, Third District, Great Falls.
C. M. Allen, Fourth District, Lo Lo.
J. H. Edwards, Fifth District, Kalispell.
Hon. Joseph K. Toole, Ex-officio Member, Helena.
Charles H. Edwards, Secretary, Butte.

INSPECTORS.

E. N. Brandegee, Inspector-at-Large for the state, Helena.
I. D. O'Donnell, First District, Billings.
H. C. Gardiner, Second District, Bozeman.
A. S. Johnson, Second District, Dillon.
Chas. H. Edwards, Second District, Butte, and Anaconda.
E. N. Brandegee, Second District, Helena.
C. E. Hubbard, Third District, Great Falls.
W. D. Luther, Third District, Glasgow.
Henry O. Wilson, Third District, Chinook.
W. B. Harlan, Fourth District, Como.
E. M. Tucker, Fourth District, Missoula.
O. A. Parsons, Fifth District, Kalispell.
O. C. Estey, Fifth District, Big Fork.

LETTER OF TRANSMITTAL.

Office of State Board of Horticulture.

Butte, Mont., January 1, 1902.

TO HIS EXCELLENCY,

JOSEPH K. TOOLE,

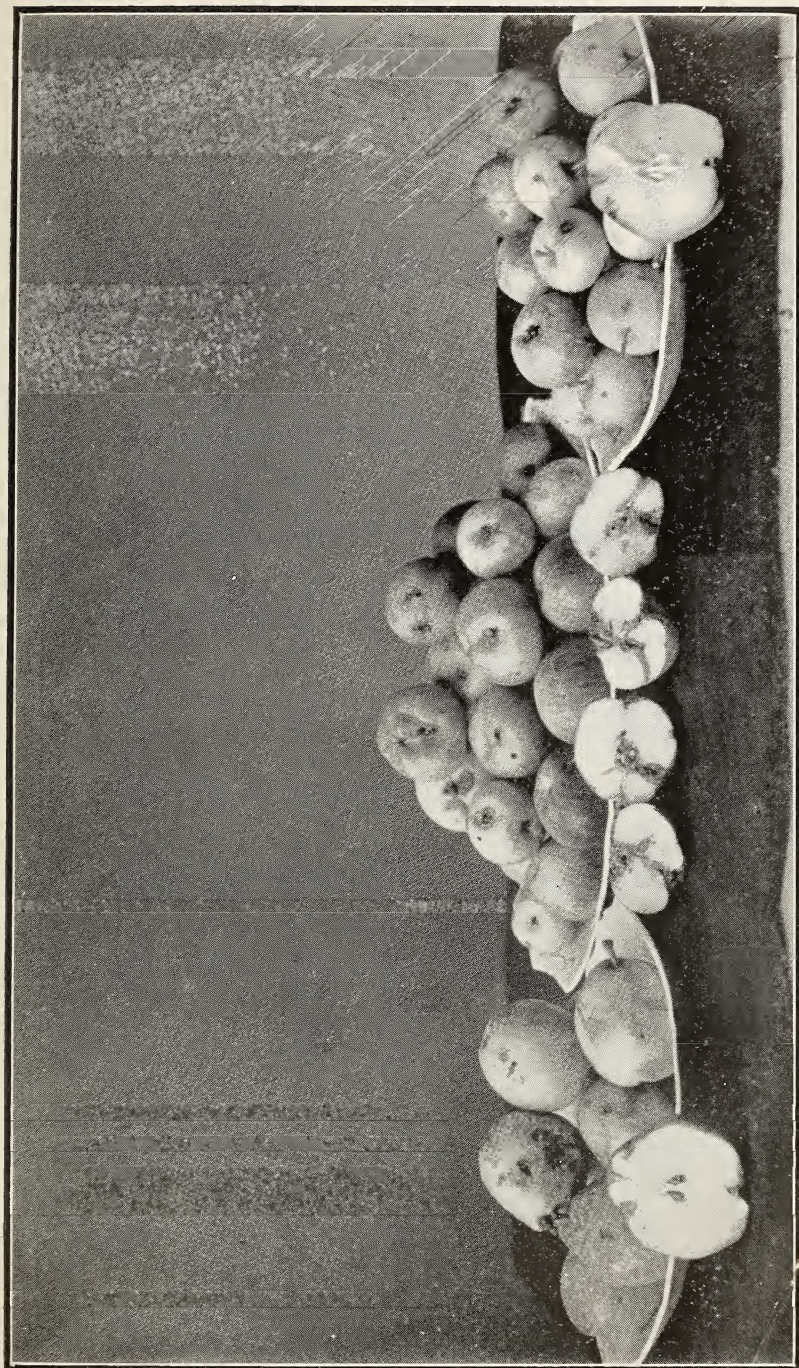
GOVERNOR OF MONTANA.

In accordance with law we have the honor to submit the Second Biennial Report, Volume II, of the Montana State Board of Horticulture for the years 1901 and 1902.

E. N. BRANDEGEE,

President.

C. H. EDWARDS,
Secretary.



Showing the effect of the codling moth.



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Report of the Montana State Board of Horticulture.

TO HIS EXCELLENCY,
JOSEPH K. TOOLE,
GOVERNOR OF MONTANA.

To the Governor and Legislative Assembly of the State of Montana:

In compliance with the provisions of law, I have the honor to submit for your inspection the following report of the work of the State Board of Horticulture and its officers and appointees for the years 1901 and 1902:

Since the publication of the First Biennial Report there has been five meetings of the board; three in Helena, one in Kalispell and one in Missoula.

The meeting held in Helena on January 24, 1901, was important inasmuch as it was at that session the rules and the law were amended. Upon motion and adoption by the board I was delegated to prepare the changes in the law in conformity with what had been accepted and passed upon by the board and to see that the same were presented to the legislature.

Mr. C. H. Campbell and myself were appointed a committee to see Mr. Stanton, of Great Falls, and have prepared a bill to be introduced in the legislature, the essence of which was to compel all nurseries doing business in the state to furnish bond and to provide license. An outline of such a bill was furnished your committee by Mr. Emery and the same was presented to Mr. Stanton, and it was his opinion that it would be best not to submit the same at that time. Your committee then consulted with the Governor and it was decided to drop the matter.

The law as amended and as it was presented to the Legislature and passed is as follows:

An Act

TO CREATE THE MONTANA STATE BOARD OF HORTICULTURE, TO PRESCRIBE ITS POWERS AND DUTIES AND TO APPROPRIATE MONEY THEREFOR.

Be it Enacted by the Legislative Assembly of the State of Montana:

Section 1. There is hereby created a State Board of Horticulture, to consist of six (6) members, five of whom shall be appointed by the Governor, one from each of the horticultural districts that are hereby created, and the State Executive who shall be an ex-officio member of the board. No person shall, however, be appointed on said board, or employed by them, who shall be connected in any way with any nursery, or who shall be engaged in the sale or handling for profit of any nursery product.

Sec. 2. The State shall be divided into the following horticultural districts: The first district shall comprise the counties of Dawson, Custer, Yellowstone, Sweet Grass, Carbon and Park; the second district shall comprise the counties of Gallatin, Madison, Jefferson, Beaverhead, Silver Bow, Lewis and Clarke, Meagher and Broadwater; the third district shall comprise the counties of Cascade, Fergus, Valley, Choteau and Teton; the fourth district shall comprise the counties of Missoula, Ravalli, Granite and Deer Lodge; the fifth district shall comprise the county of Flathead.

Sec. 3. The members shall reside in the district for which they are appointed. They shall be selected with reference to their study of and practical experience in horticulture and the industries dependent thereon. They shall hold office for a term of four years and until their successors are appointed and qualified, provided, however, that two of the board first appointed—to be determined by lot—shall retire at the expiration of two years. All vacancies in the board shall be filled by appointment of the Governor and shall be for the unexpired term.

Sec. 4. The Board is authorized to employ a secretary and prescribe his duties, who shall hold his appointment at the pleasure of the board. Before entering upon the discharge of his duties, each member and employe of the Board shall take and subscribe to the oath of office, which said oath shall be filed with the Secretary of State.

Sec. 5. The Board may call together and hold, in conjunction with horticultural societies, public meetings of those interested in horticulture and kindred pursuits, and may publish and distribute

such proceedings and discussions as in its judgment may seem proper, provided the sum so expended shall not exceed the sum of \$300 per annum.

The Board shall meet on the third Monday of February and September of each year and as much oftener as it may deem expedient.

Sec. 6. The office of the board shall be located at such place as the majority thereof may determine, and shall be in charge of the secretary during the absence of the board.

Sec. 7. For the purpose of preventing the spread of contagious diseases among fruit and fruit trees, and for the prevention, treatment, cure and extirpation of fruit pests and the diseases of fruits, orchard debris, empty fruit boxes or packages and other suspected material or transportable articles dangerous to orchards, fruits and fruit trees, said board may prescribe regulations for the inspection and disinfection thereof, which regulations shall be circulated in printed form, by the board, among the fruit growers and fruit dealers of the state, and shall be published at least ten days in two horticultural papers of general circulation in the state, and shall be posted in three conspicuous places in each county of the state, one of which shall be at the county court house thereof.

(See amended section.)

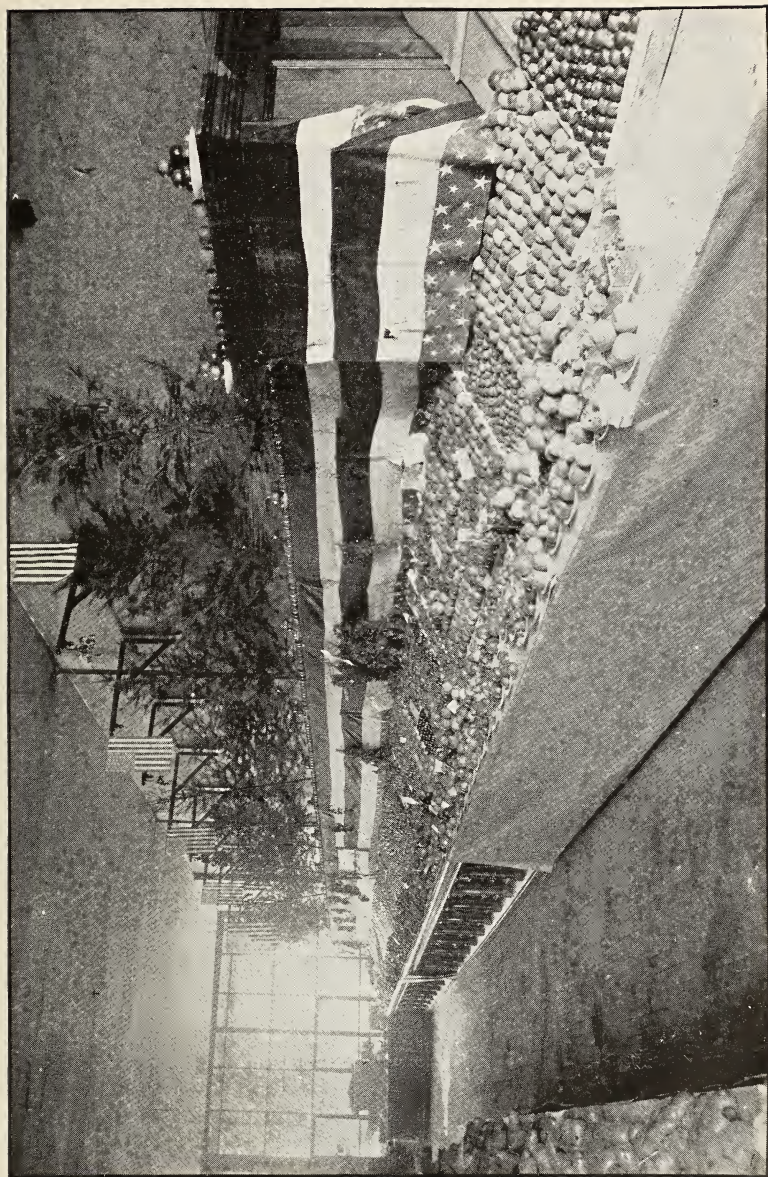
Sec. 8. The said board shall elect from their own number or appoint from without their number, to hold office at the pleasure of the board, one competent person in each district, to be known and to act as "Inspector of Fruit Pests." Said inspectors shall be selected with reference to their study and practical experience in horticulture. It shall be the duty of said inspectors to visit the nurseries, orchards, stores, packing houses, warehouses and other places where horticultural products and fruits are kept and handled within their respective districts and to see that the regulations of the state board of horticulture to prevent the spread of fruit pests and disease of trees and plants, and the disinfection of fruit trees, plants, grafts, scions, orchard debris and empty fruit boxes and other material shall be fully carried out and complied with. Said inspectors shall have free access, at all times, to all the premises where any trees, plants, fruits or horticultural products or supplies are kept or handled and shall have full power to enforce the rules and regulations of the State Horticultural Board, and to order the destruction or disinfection of any or all trees, plants, fruits or horticultural products or supplies found to be in-

fectured with any disease, as prescribed or designated by said board. (See amended section.)

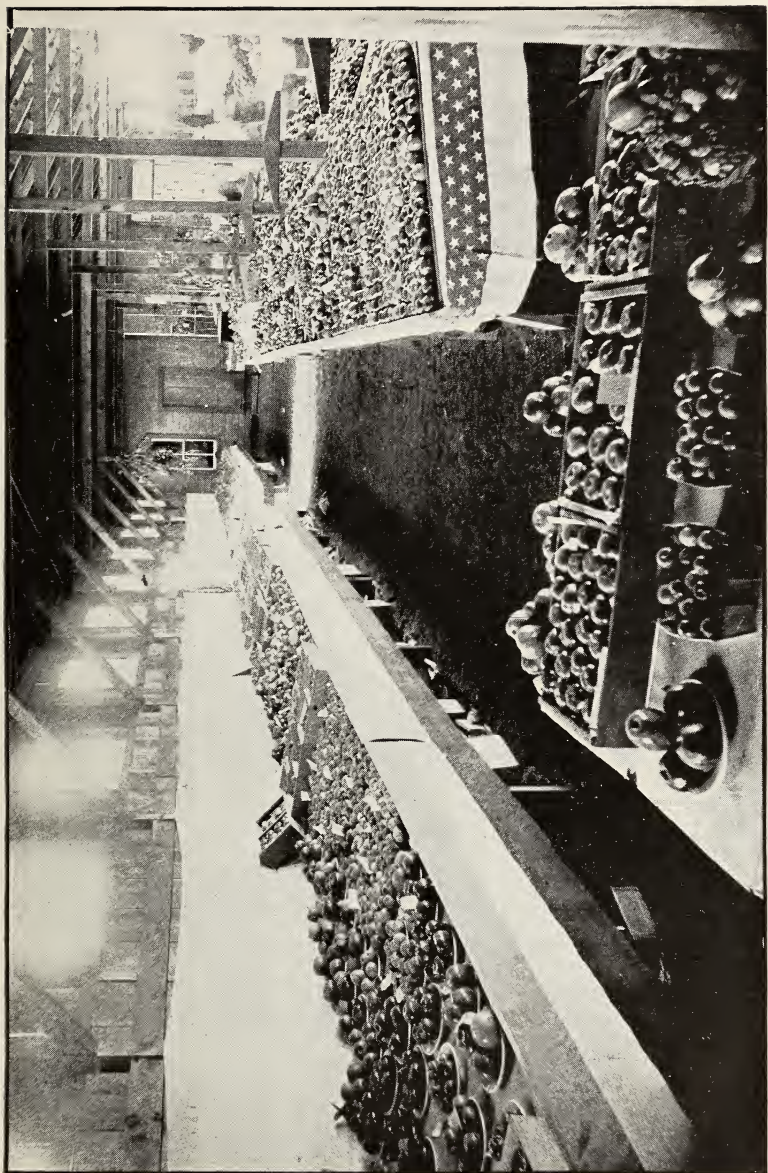
Sec. 9. It shall be the duty of every person or persons, corporation or corporations, who shall sell or deliver to any person or persons, corporation or corporations, any trees, plants, vines, scions or grafts, to notify the inspector of said district wherein such trees, plants, vines, etc., etc., are to be delivered at least five days before said goods are to be delivered, giving the date and nursery or railroad station where said trees, plants, scions, etc., etc., are to be delivered, together with the name of the party or parties who are to receive the same. It shall be the duty of the inspector receiving said notice to inspect the said trees, plants, grafts, scions, etc., etc., as soon thereafter as practicable, and at the point where the same are to be delivered, and if the same be found free from any and all diseases or pests, as designated by said State Board of Horticulture, he shall so certify and shall attach such certificate to each lot or bill of such trees, plants, scions, grafts, etc., etc., which said certificate must contain a list of said trees, grafts, scions, plants or vines so inspected. But if any of the trees, grafts, scions, vines or plants so infected shall be found to be diseased or infested with any of the pests as prescribed by said board, then the inspector shall order the destruction of such trees, grafts, scions, vines, etc., etc., so diseased or infested, together with all boxes, wrapping or packing pertaining thereto. (See amended section.)

Sec. 10. If any person or persons in charge or control of any nursery, orchard, storeroom, packing house or other place where horticultural products or supplies are handled or kept, shall fail or refuse to comply with the rules and regulations of the said State Board of Horticulture, or shall fail or refuse to disinfect or destroy any diseased or infected trees, plants, vines, scions, grafts, shrubs or other horticultural supplies or products, when ordered so to do, by the inspector of such district, he shall be deemed guilty of a misdemeanor and upon conviction thereof shall be fined in any sum not less than \$25 nor more than \$300.

Sec. 11. It shall be the duty of every owner or manager of every orchard, nursery, storeroom, packing house or other place where horticultural products or supplies are kept or handled, which shall become diseased or infected with any injurious insect or pest, to immediately, upon discovery of the existence of such disease or pest, to notify the inspector of said district of the existence of the same. It shall be the duty of such owner or manager at his own



Section of Fruit Exhibit at Missoula Fair.



Section view of Fruit Exhibit, Missoula Fair.

proper expense to comply with and carry out all the instructions of said inspector for the eradication of said disease or pests. Any person who shall fail or refuse to comply with the instructions of said inspector for the eradication of any disease or pest, shall be deemed guilty of a misdemeanor, and upon conviction thereof shall be fined in any sum not less than \$25 nor more than \$300.

Sec. 12. If any person or persons, corporation or corporations shall fail or refuse to forthwith comply with the instructions of said inspector, for the eradication of any disease or pest, said inspector shall proceed forthwith to eradicate such disease or pest and the expense of the same shall become a charge and a lien upon the property of such owner.

Sec. 13. Every person who, for himself or as agent for any other person or persons, corporation or corporations, transporting company or common carrier, shall deliver or turn over to any person or persons, corporation or corporations, any trees, vines, shrubs, nursery stock, scions, grafts, without first having attached the inspector's certificate, as provided in Section 9 of this Act, shall be deemed guilty of a misdemeanor and upon conviction thereof shall be fined in a sum not less than \$25 nor more than \$300.

Sec. 14. No person or persons, corporation or corporations, shall be liable to any other person or persons, corporation or corporations for any damage to any trees, vines or shrubs, nursery stock, scions or grafts by reason of the same being held to await the certificate of the inspector, as provided in Section 9 of this Act.

Sec. 15. The inspectors of fruit pests appointed or elected by said board shall receive as compensation for their services the sum of \$5.00 (five dollars) per day for the time actually employed; provided, however, that no inspector shall receive more than three hundred dollars in any one year when acting as such inspector of fruit pests. The members of said board shall receive no compensation for their services except actual expenses paid out. The secretary of said board shall receive the sum of \$1,000 per annum for his services.

Sec. 16. All bills for expenditures, under this Act, shall be audited and passed upon by said Board of Horticulture, and if found legal and just, shall be allowed, subject to the approval of the State Board of Examiners, and a warrant shall be drawn therefor upon the Auditor of the State of Montana who shall draw his warrant upon the State Treasurer therefor.

Sec. 17. It shall be the duty of the secretary to attend all meetings of the board and procure records of the proceedings and correspondence, to collect books, pamphlets, periodicals and other documents containing valuable information relating to horticulture, and to preserve the same; to collect statistics and other information showing the actual condition and progress of horticulture in this state and elsewhere; to correspond with agricultural and horticultural societies, colleges and schools of agriculture and horticulture and other persons and bodies as may be directed by the board, and prepare, as required by the board, reports for publication; he shall also act as assistant to and obey the directions of the inspectors of fruit pests, under the direction of the board.

Sec. 18. The board shall biennially, in the month of January, report to the legislature a statement of its doings and abstracts of the reports of the inspectors of fruit pests and of the secretary.

Sec. 19. There is hereby appropriated for the use of the State Board of Horticulture, as set forth in this Act, out of the moneys in the state treasury not otherwise appropriated, the sum of three thousand (\$3,000) dollars, or as much thereof as may be necessary for the year commencing March 1, 1899, three thousand six hundred (\$3,600) dollars, or as much thereof as may be necessary for the year commencing March 1, 1900. (See amended section.)

Sec. 20. All sums of moneys collected as fines for violations of any of the provisions of this Act shall be turned into the state treasury for use in defraying the expenses of the board hereby created, and the appropriations hereby made shall be paid out of the fund to the extent of the money therein contained.

A BILL FOR

An Act Entitled, "An Act to Amend Sections 7, 8, 9 and 19 of an Act to Create the Montana State Board of Horticulture, to Prescribe its Powers and Duties and to Appropriate Money Therefor."

Be it enacted by the Legislative Assembly of the State of Montana :

That section 7 of an "Act to create the Montana State Board of Horticulture, to prescribe its powers and duties, and to appropriate money therefor," as enacted by the Sixth Legislative Assembly of the State of Montana, be amended to read as follows:

Section 7. For the purpose of preventing the spread of contagious diseases among fruit and fruit trees and for the prevention, treatment, cure and extirpation of fruit pests and diseases of fruit and fruit trees, and for the disinfection of grafts, scions and or-

chard debris, empty fruit boxes or packages and other suspected material or transportable articles dangerous to orchards, fruit and fruit trees, said board may prescribe regulation for the inspection, disinfection or destruction thereof, which regulation shall be circulated in printed form by the board among the fruit growers and fruit dealers of the state and shall be published at least ten days in two horticultural papers of general circulation in the state, and shall be posted in three conspicuous places in each county in the state, one of which shall be at the County Court House thereof.

That section 8 of said Act be amended so as to read as follows:

Section 8. The said board shall elect from their own number or appoint from without their number, to hold office at the pleasure of the board, one competent person in each district to be known and act as "Inspector of Fruit Pests." Said inspectors shall be selected with reference to their study and practical experience in horticulture. It shall be the duty of said inspectors to visit the nurseries, orchards, stores, packing houses, warehouses and other places where horticultural products and fruits are kept and handled within their respective districts, and to see that the regulations of the State Board of Horticulture to prevent the spread of fruit pests and diseases of trees and plants, and the disinfection of fruits, trees, plants, grafts, scions, orchard debris and empty fruit boxes and other material shall be fully carried out and complied with. Said inspectors shall have free access, at all times, to all premises where any trees, plants, fruits or horticultural products or supplies are kept or handled, and shall have full power to enforce the rules and regulations of the State Horticultural Board, and to order the destruction and disinfection of any or all trees, plants, fruits or horticultural products or supplies found to be infected with any disease as prescribed or designated by said board.

The said board may appoint one or more, as necessary, competent persons to be known as "Special Fruit Inspectors" whose general power and duties shall be the same as those prescribed in this section to govern "Inspectors of Fruit Pests," and whose especial duty shall be the inspection of fruits offered for sale in the state of Montana.

Such special fruit inspector shall receive such sum per day as the said Board of Horticulture may agree upon, provided such sum shall in no case exceed the sum of five dollars per day for the time actually employed, and further provided that such compensa-

tion shall not exceed the amounts charged and collected as fees for such inspection.

That section nine of said act be amended so as to read as follows:

Section 9. It shall be the duty of every person or persons, corporation or corporations, who shall sell or deliver to any person or persons, corporation or corporations, any trees, plants, vines, scions or grafts, to notify the inspector of said district wherein such trees, plants, vines, etc., etc., are to be delivered, at least five days before said goods are to be delivered, giving the date and nursery or railroad station where said trees, plants, scions, etc., etc., are to be delivered, together with the name of the party or parties who are to receive the same. It shall be the duty of the inspector receiving said notice to inspect the said trees, plants, grafts, scions, etc., etc., as soon thereafter as practicable and at the point where the same are to be delivered, and if the same be found free from any and all diseases or pests, as designated by said State Board of Horticulture, he shall so certify and shall attach such certificate to each lot or bill of such trees, grafts, plants, scions, etc., which said certificate must contain a list of the said trees, grafts, scions, vines or plants so inspected. But if any of the trees, grafts, scions, vines or plants so inspected shall be found to be diseased or infested with any of the pests, as prescribed by said board, then the inspector shall order the disinfection or destruction of such trees, grafts, scions, vines, etc., etc., so diseased or infected, together with all boxes, wrapping or packing pertaining thereto, provided, that the State Board of Horticulture shall have power to designate certain places as quarantine stations, where all nursery stock brought into the state shall be inspected and disinfected. The state board of horticulture shall charge and collect from each nursery inspected the sum of ten dollars, and a proportionate sum for less than car lots, but in no instance less than two dollars for each separate inspection or disinfection. For the inspection of fruits a fee of two cents per box or package with a maximum fee of five dollars for each separate lot or car shall be charged and collected. The inspectors shall collect such fees and shall not give certificates of inspection until the fees are paid.

That section nineteen of said act be amended so as to read as follows :

There is hereby appropriated for the use of the State Board of Horticulture, as set forth in this act, out of the moneys in the state treasury, not otherwise appropriated, the sum of twenty-five hun-

dred dollars, or so much thereof as may be necessary for the year commencing March 1, 1901. Three thousand dollars, or as much thereof as may be necessary, for the year commencing March 1, 1902, said appropriation of money to be payable out of the revenues of the state of Montana for the year 1902.

Section 20. All Acts and parts of acts in conflict herewith are hereby repealed.

The next meeting of the board was held in Kalispell and was a very brief one. During the meeting of the horticultural society in that city it was thought best to hold the board meeting, but as some of the members failed to appear the business set for the meeting was postponed to the meeting held in Helena.

On April 8, 1901, the board met in Helena. There were present, Governor Toole, Olney Taylor, C. H. Campbell, S. M. Emery, J. H. Edwards and S. Dinsmore.

The chief work of this meeting was the changing of the rules to conform to the new law. This was the subject of the morning and afternoon meetings. The following are the rules and regulations as amended:

RULES AND REGULATIONS.

Under the law, the term nursery stock is construed to mean and include fruit, shade and ornamental trees (deciduous or evergreen), shrubs, plants, roots, bulbs, buds, scions, cuttings or other portions of plants, shrubs, or trees designed to be replanted in Montana for home or commercial use.

For the purpose of preventing the importation and spread of contagious diseases among fruits, fruit trees and nursery stock, and for the treatment, cure and extirpation of fruit pests, the Montana State Board of Horticulture established (in accordance with an act to create the Montana State Board of Horticulture, to prescribe its powers and duties, approved February, 1899), the following rules and regulations and ask the earnest co-operation of all fruit growers, dealers and all persons interested in maintaining the present high grade of Montana fruit, in carrying out the important work.

Rule 1. All nursery stock, trees, plants, vines and cuttings grown or growing within the state of Montana, used for filling orders, shall be inspected by a duly appointed inspector and shall be disinfected by fumigating or other method, when in his judgment such is necessary. After such inspection, if it be found that

said nursery stock, trees, plants, vines and cuttings are clean and free from insects and fungi pests, he shall issue his certificate to said nurseryman and said certificate shall entitle him to use said stock, so inspected and disinfected, for filling nursery orders for the next current delivery.

Rule 2. It shall be the duty of the inspector after receiving notice of the arrival of any nursery stock to immediately have the same inspected or fumigated and he shall, if he finds after inspection said nursery stock free from any and all diseases, place his certificate upon each and every package, showing that the said nursery stock has been inspected or fumigated, giving name of the inspector, the date of inspection and place, but if the said nursery stock be found to be infected with any of the diseases or insects injurious to orchards as prescribed by the Board of Horticulture, other than the San Jose Scale, Woolly Aphis, Black Knot of the plum and Black Knot of the cherry, the said diseased stock shall be properly treated, but if the said nursery stock shall be infected with San Jose Scale, Woolly Aphis, Black Knot of plum, Black Knot of cherry, then the inspector shall destroy the same by burning, together with all wrapping and packing and shall issue a certificate to the shipper or owner showing cause for destruction.

Rule 3. All nursery stock, trees, plants, vines and cuttings of any kind shipped into or brought into the state of Montana, before delivery to the purchaser shall be unpacked from the boxes and in case of baled and burlapped shipments, these coverings shall be removed and the stock shall be inspected and fumigated at Miles City, Billings, Dillon, Missoula, Kalispell, Great Falls or Glasgow, which points are hereby designated as quarantine stations.

All nursery stock, trees, plants, vines and cuttings brought into Montana by any transportation company, shall be inspected and fumigated at the point of delivery, provided said point of delivery shall be one of the above designated quarantine stations; but if any shipments shall be filled for delivery at any other points in Montana, they shall be inspected or fumigated at the quarantine station on the line of such transportation company next preceding or nearest the point of delivery to which they are billed.

All such nursery stock, trees, plants, vines, cuttings brought into the state of Montana by wagon shall be inspected and treated at the nearest quarantine station, as hereinbefore mentioned, to the point where such nursery stock, trees, plants, vines and cuttings enter the state.

The certificate of the inspector making such examination and

inspection shall exonerate the shipper and consignee from any and all penalties provided by law.

Rule 4. Importers or owners of nursery stock, trees, vines, plants and cuttings who shall desire to have such nursery stock, trees, plants, vines and cuttings inspected and fumigated at points in Montana other than the regular quarantine stations, may have such inspection and fumigation made at any point designated by such importer or owner; provided, however, that such importer or owner shall pay all charges of inspection and fumigation and all expenses of the officer employed in such inspection and fumigation, such charges and expenses to be paid before a certificate is granted.

Rule 5. All boxes, packages, wrapping and packing used in the importation of nursery stock, trees, plants, vines and cuttings into the state of Montana shall be destroyed by burning the same as soon as emptied of their contents.

Rule 6. It shall be unlawful for the owner or importer of any fruits, green or dried, nursery stock, trees, plants, vines and cuttings to allow any of the boxes, bales, etc., in which fruit is packed, any debris of such nursery stock, trees, plants, vines and cuttings, to accumulate or become a menace to the fruit industry; and the destruction of all such debris is hereby ordered, and inspector of such district will see that all such debris is destroyed by burning.

Rule 7. The inspector of each district shall inspect or cause to be inspected, each and every orchard within his district annually, unless otherwise ordered by the board. He shall see that the owner or owners of any premises where trees, plants, vines, etc., are growing shall obey the instructions of the state board.

Rule 8. It shall be unlawful for any person to spray any tree, plant or shrub when the same is in bloom, with any substance injurious to bees or honey.

Rule 9. In the absence of the inspector of any district or in the event that he cannot or does not perform, for any reason, the work required, the member of the State Board of Horticulture for said district may appoint temporarily such assistant inspectors as may be necessary for such work.

Rule 10. All inspectors shall, at the close of each week, report to the secretary of said board a complete statement of his doings, upon the proper blanks furnished for that purpose, together with an itemized bill for his labor for the time actually served by him during such week, which bill, when properly audited by the member of the State Board of Horticulture for the district in which said

inspector shall labor, be again audited by the president and secretary of the state board and forwarded to the state board of examiners for payment.

Rule 11. Inspectors, other than special fruit inspectors, shall receive as compensation the sum of \$5.00 for each and every day actually served, but such inspector shall pay his own expenses.

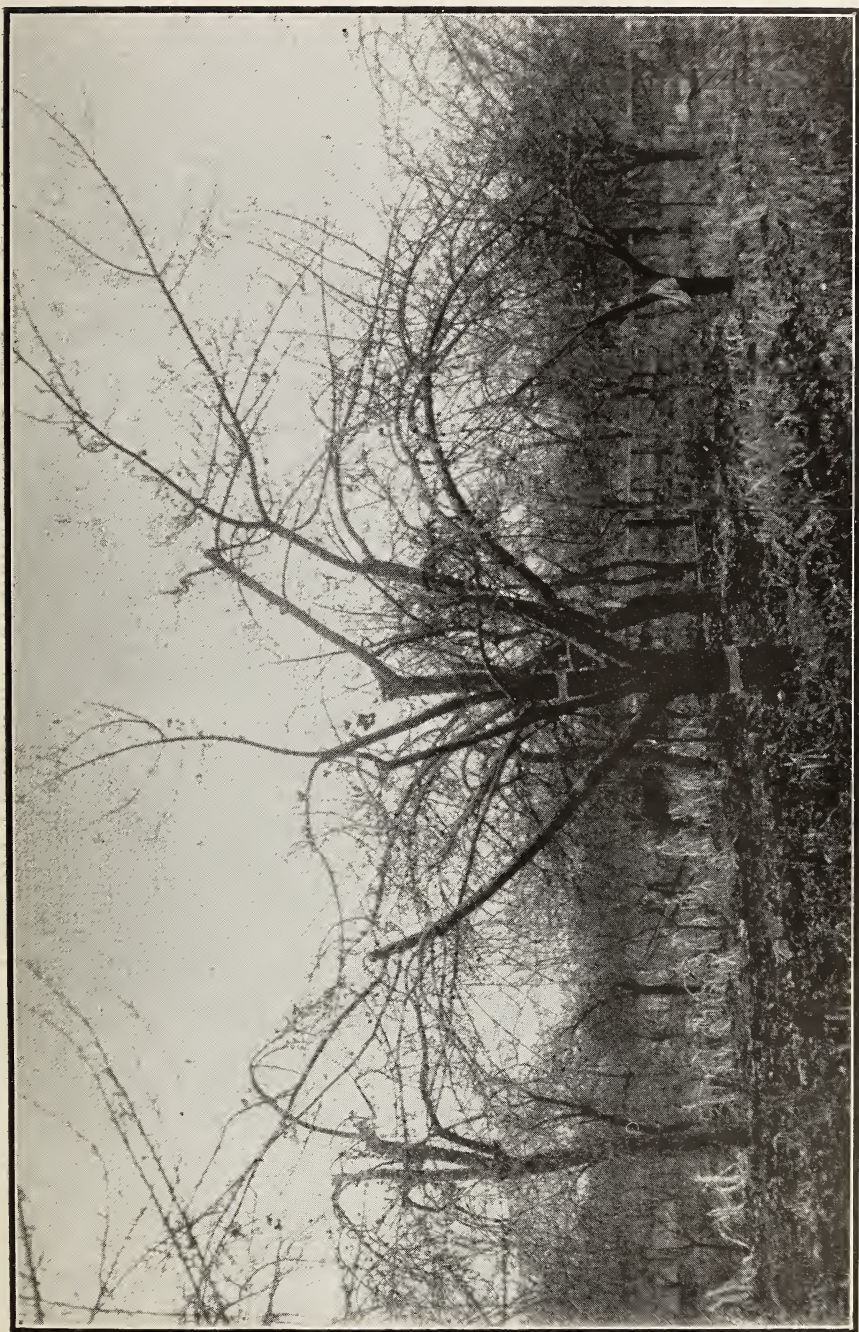
Rule 12. All inspection and fumigation shall be under the charge and supervision of the inspector at large, and all inspectors shall be responsible to him.

Rule 13. The inspectors appointed by this board are authorized to inspect in their respective districts any and all nursery stock, trees, plants, shrubs, vines and fruits, and to collect the fees prescribed in these rules and regulations from the owner or person in control of such nursery stock or fruits wherever found. All fruits inspected and found free of any disease or infection shall be branded "Inspected and Passed," together with the date of the inspection and number of district in which inspected, but if found to be infested with any injurious insects or disease, shall be condemned and destroyed by burning by the inspector without exception.

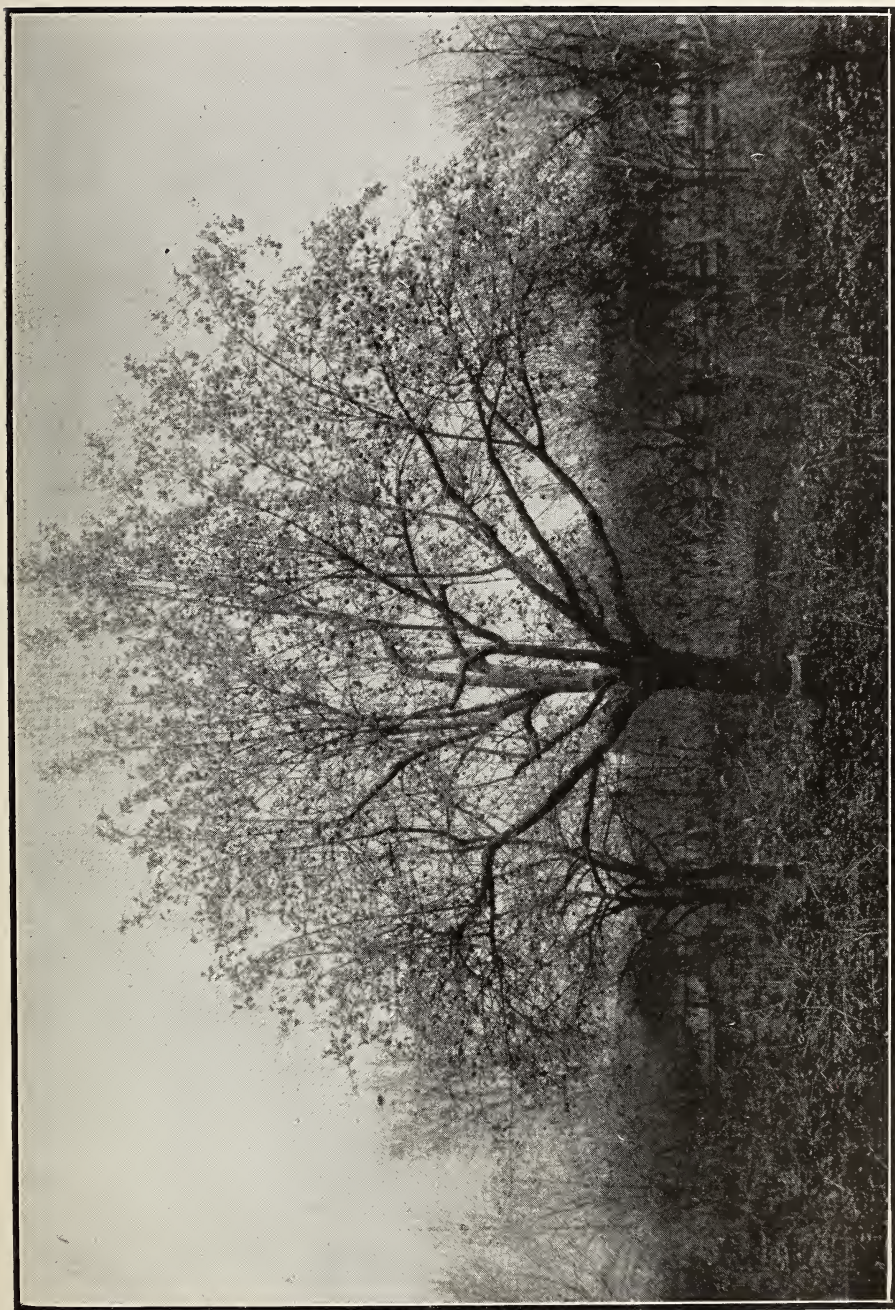
Rule 14. For the inspection of each nursery the sum of \$10.00 shall be collected, for each car of nursery stock inspected or disinfected the sum of \$10.00 shall be collected and a proportionate sum for less than car lots, but in no instance shall a sum of less than \$2.00 for each separate inspection or disinfection be collected. For the inspection of fruits a fee of two cents per box or package, with a maximum fee of \$5.00 for each separate lot or car shall be charged and collected and the inspectors shall collect such fees and shall not give certificate of inspection until fees are paid. All fees collected for inspection and fumigation shall be turned over by inspectors to the secretary of the board each week with his report, and shall be paid out on the order of the president and secretary.

Rule 15. It shall be the duty of each person or corporation offering to sell or selling and delivering any nursery stock, trees, plants, vines, scions, cuttings, etc., within the state of Montana to place on each and every package so sold and delivered a label or card stating whether or not said trees, plants, vines, scions, cuttings, etc., were grown in the state of Montana or otherwise.

Rule 16. The special fruit inspectors appointed by the board shall, in all districts, excepting district No. 2, receive as compensation for the work of inspection of fruits the sum total of the fees



Pruned for spraying and banded.



Pruned for spraying and banded

collected, provided, however, that the sum shall not exceed \$5.00 per day for each day's work devoted to inspection..

By fumigation it is to be understood treatment with hydro-cyanic acid gas. This treatment should be done as follows: All nursery stock to be treated should be placed in an air tight tent or box. For every one hundred cubic feet of space in box or tent, take one ounce, "Avoirdupois weight," of fused potassium cyanide, ninety-eight per cent strength, preferably in lumps about the size of a walnut; one and one-half ounces commercial sulphuric acid, best grade, and two and one-fourth fluid ounces of water. First: Place the water in a three-gallon vessel (which may be of glazed earthenware); to this add the acid and finally the potassium cyanide. (The cyanide would better be enclosed in a small paper bag in which a hole is torn.) Immediately close the doors or openings, taking all precautions against inhaling the gas, as it is one of the most violent poisons known. After leaving box or tent closed for forty minutes, open all doors and allow at least one hour for thorough ventilation before attempting to remove the stock. No injury is caused to nursery stock if the gas is left in more than forty minutes.

Resolved: The State Board of Horticulture suggests that consumers purchase only fruits that bear the name of the grower upon the package.

List of insects and fungi to guard against:

INSECTS.

San Jose Scale.

Oyster Shell Bark Louse.

Woolly Aphis.

Codling Moth.

Flat Head Apple Tree Borer.

Blister Mite of the Pear.

Apple Maggot.

FUNGI.

Black Knot of Plums.

Black Knot of Cherries.

Twig Blight of the Pear.

Leaf Blight of the Apple.

Butte, Mont., April 13, 1901.

As instructed by the board the following circular was addressed to all transportation companies doing business in the state of Montana:

I am directed to notify you that "the Montana State Board of Horticulture interpret section 9 of the organic law creating said board with respect to 'five days notice of shipment' to apply to nurserymen, dealers and salesmen and not to railways." The board will greatly appreciate all possible notice on your part to inspectors of the respective districts of shipments of nursery stock and of fruits as soon as such information comes to your knowledge.

The following officers were elected: S. M. Emery, President; C. H. Edwards, Secretary; Dr. E. V. Wilcox, Inspector-at-Large and Inspector for the Second District; Olney Taylor, Inspector for the First District; Mr. C. H. Campbell, Inspector for the Third District; W. B. Harlan and J. O. Read, Inspectors for the Fourth District, and O. C. Estey, for the Fifth District.

According to instructions of the board the following notice was sent to all news companies doing business on railway trains in the state :

"You are hereby notified that all infested fruits found on trains in possession of news agents will be seized and destroyed by inspectors of the board of horticulture. You are requested to see that all stock furnished your agents will be free from any disease."

During the months of April and May the time of this office was taken up with preparation work. The passage of a new law and the drafting of necessary rules and regulations demanded the editing of both law and rules for the printer and also necessitated an entire change in the forms of reports used. New orchard reports, fee certificates, condemnation certificates, fruit inspected blanks and condemned fruit blanks. After these were all received they were distributed to all inspectors and board members.

On June 1st, the office of the board was opened in Butte. This became necessary in order that the board should be in close touch with the greatest fruit market. It has since proved to have been a wise move, for it is into Butte that the major portion of all the fruit imported into our state arrives. The office of secretary and inspector were combined and the double duties have ever since been performed at a saving to the state of \$1,000 per annum.

After securing a place to work in the subject of the inspection of

all fruits coming into our state was then taken up and has been ever since one of the most important problems.

That the dealers throughout the state and those importing fruits into the state might have no excuse to plead ignorance, a circular was issued and delivered to all dealers in the state and sent to the importers throughout the west, acquainting them fully as to our law and methods of fruit inspection and calling their attention to the fact that no diseased fruits would be accepted. This circular proved to be very effectual and resulted in keeping out much badly infested fruits.

To further the work of inspection, it was suggested by the dealers that the board issue a circular that might be furnished in quantities and sent by dealers to their customers throughout the country. This was done and many dealers were prompt to take advantage and thus serve notice upon their shippers that if they intended to supply any fruits they must be absolutely free of disease.

INSPECTORS' MEETING.

The necessity for concerted action among inspectors of fruit, especially in the prominent markets of the state, suggested to me the advisability of a meeting that questions of vital interest to the work might be discussed. To this end I presented the matter to Mr. S. M. Emery, president of the board, and was directed by him to call such meeting. It was decided as a matter of economy that only the inspectors from Missoula, Great Falls and Helena and Butte be called, these points being the chief distributing ones of the state and that the conclusions reached at this meeting should be sent to all inspectors of the state.

The results of the deliberations at Helena is herewith presented and it is hoped that they may be found of value to the inspectors and members of the board.

S. M. EMERY, President, Manhattan.

C. H. EDWARDS, Secretary, Butte.

Meeting of the Montana fruit inspectors called by the president and secretary of the board was held at Warren Hotel, Helena, July 7th, 1901. E. N. Brandegee was elected chairman and C. E. Hubbard secretary.

At the close of the meeting it was moved by Mr. Edwards, seconded and duly passed, that E. N. Brandegee write a synopsis of the proceedings, together with any suggestions and recommendations that he might consider of immediate usefulness to inspectors.

The meeting was unanimous in opinion that fruit once inspected and passed and duly stamped should not be subsequently condemned unless found to be infected in locality contagious to orchards where the danger of infestation of the trees was great. That in such localities an inspector needed special vigilance, and in accordance with this view the following resolution was unanimously passed :

“Resolved, That where fruits had been inspected and passed by the inspector of any district and said fruits shall pass under the observation of any inspector of any other district and shall be found to be infected with either codling moth or San Jose scale, the inspector discovering the same shall use his best judgment as to condemning the infected fruits and shall notify the inspector of the district whence said infested fruit came.”

In case of condemnation of fruit once passed by another inspector it would be well to submit samples to the first inspector in case of condemnation because of infestation by scale insects. The inspectors also agreed to submit samples freely to each other of scales as they appear on different fruit for some time to come and whenever any new scale or peculiar form is encountered.

The Codling Moth was voted the most difficult pest to deal with. It was suggested that some percentage of infection be recognized above which fruit should be condemned and below which it should be allowed to pass. This was deemed inadvisable. Whereas, if we admit apples at the present time from other states, we admit Codling Moth, no matter how careful the sorting of the fruit, yet that sorting can be made more careful and the time can be brought about when the Codling Moth will not come at all. At present it may be necessary to admit some. In a month from now the percentage of infected fruit should be very small and in a year from now it should be almost unknown.

Red Astrachans are the worst apples in market at the present time and in another year, perhaps, these early shipments of apples should be restranied. Too often the early apple is ripened by the Codling Moth.

It was deemed best, if consistent with the rulings of the board, that a shipper be allowed, under certain circumstances, to withdraw his shipment from the state. It was shown that but rarely would this be necessary or advisable. But sometimes a carefully sorted and carefully packed car of fruit comes in with the Codling Moth of the first brood, whose presence was unknown, apparently, to the packer, but had developed since shipment. Under these con-

ditions the inspectors deemed it advisable, if the shipment was a dangerous one, to allow the owner the option of withdrawing the car and requested Mr. Edwards to submit the matter to the board.

It was agreed that while the inspector should not fear to condemn when necessary, yet the results aimed at should be attained with as little destruction as possible of property. Fruit free from insect pests must be the only fruit finally sent to Montana markets. At first more condemnation would be necessary than later, when all shippers were vividly aware of the law. The little fruit that might be condemned was not the object but the influence on the packer who sent subsequent cars. In all instances the co-operation of the local importers was always desirable. They are always interested in getting the best fruit. In this way, eventually, only localities and shippers who send the best fruit and fruit free from infection will supply Montana markets.

How much inspection in a carload of fruit was necessary to determine its condition for condemnation or passing was discussed. It was agreed that much depended upon the inspector's acquaintance with previous cars from the same shipper or the same locality, and also upon the kind of fruit. Lemons and oranges need less scrutiny generally than other kinds. Apples, pears, peaches, plums, apricots and quinces in the order named require more; and apples and pears at all times need careful examination. The Snake River Valley and country around Walla Walla were most liable to send the San Jose scale. In the experience of the inspectors, fruit near the door of the car was a fair sample of the contents of the car. No covering up of infected fruit in this way had been detected. At all times, however, it is well to examine at the door and if the fruit proves all right examine further from time to time as unloading progresses. When more than one brand or more than one kind of fruit is in the same car, examine each fully.

During the warm weather importers of the carload refrigerate in the cars and bill orders directly from it. This has inconvenienced inspectors in Butte and Helena and interferes with stamping.

At all times possible it is well to view fruit exposed for sale at fruit stands. If the inspector has made an oversight the knowledge of it, though too late, perhaps, in the one instance, will enable him to prevent a repetition.

Samples of San Jose on peaches and apples were exhibited and also fruit preserved in formalin 10 per cent solution by Mr. Edwards. Specimens of the red scale in two forms were shown on

orange and lemon. The oyster shell bark louse of citrus fruits and excellent specimens of Codling in larval form were exhibited.

Mr. Edwards proposed that blanks informing shippers of the inspection law be prepared and furnished the importers, by them to be enclosed with orders for fruit. This was deemed by all the inspectors of the highest importance and that the use of such documents would materially improve the quality of fruit packed for Montana, was recognized by all.

In accordance with this resolution I submit the following report :

Mr. Edwards was requested as secretary of the board or through the influence of Mr. Emery, its president, to procure for each inspector a copy of the 1900 Year Book of the Department of Agriculture. An article in it relating to scale insects of citrus fruits was deemed valuable.

The similarity of a certain fungus which appears on apricots and Bellflower apples to the San Jose scale was commented on. Also a fungus on peaches often produces a reddening of surrounding tissue which is somewhat similar to the reddening produced by the San Jose scale. In all cases where fruit is infected with the San Jose scale this reddening should be present. This does not, definitely, determine it as San Jose. If the red spots are present the fruit should be carefully examined. If the spots are produced by San Jose, usually the scales are in all stages. Among them a well developed scale can be found. From this raise the armor. A yellow insect will be beneath evident even to the naked eye. Under a hand glass more of its features may be determined. And under a compound microscope its posterior with characteristic ornamentation will finally determine San Jose in my brief experience beyond a doubt.

The red scale and the oyster shell bark louse of citrus fruit confine themselves to citrus fruit. The San Jose I have never seen on citrus fruit. I believe, however, that there also it will show the same reddening and that there will be no difficulty of its determination.

On western fruit it is easy to determine San Jose. If it reddens and is a scale insect at all it is probably this scale. With some of the eastern species there is more danger of confusion.

Eastern apples at best are so bad that they should not be allowed in Montana markets. All that I have seen have nearly all the diseases known to appledom and a few cars of them contain more noxious germs than all the western fruit combined.

I believe that concerted action of inspectors should keep this fruit from the market unless it is up to the western standard. This standard at present is prohibitive to eastern apples.

When receipts for fruit condemned are issued to the owners of the fruit, the name on the box should be written on the receipt. For instance, if fruit sent from Lindsay is condemned in Missoula, it is not necessary to put Lindsay's name on the certificate, but the name of the California shipper or the name of the fruit. All these importers hold consignors liable for fruit condemned, but it is necessary that the receipt should indicate plainly what fruit it was.

In conclusion I wish to congratulate the inspectors that they have among their number a member of the board and its secretary: and further, that he is located in Butte, which is the chief battle ground. Through this fact there will be a better realization by the board of the difficulties which confront an inspector and a closer union of all engaged in the work and a better service.

E. N. BRANDEGEE, Inspector, Helena.

Second District.

C. E. HUBBARD, Inspector, Great Falls.

Third District.

J. O. READ, Inspector, Missoula.

Fourth District.

C. H. EDWARDS, Secretary and Inspector, Butte.

Second District.

What the Board Has Accomplished.

During the four years existence of the board a vast amount of good work for the horticultural interests of the state has been accomplished. Especially is this true when the small appropriation—\$12,100.00 for the four years—is considered.

Immediately after the organization of the board in March, 1899, inspectors for the five districts were appointed and as early as practicable an examination of all the orchards and places wherein fruit trees were grown were inspected for the purpose of finding out if there were any diseased orchards in the state and also to secure data that would enable the board to know as near as possible how many fruit trees and acres of small fruits there were in the state and other valuable data for the further guidance of the work. This work has been carried on during the four years and considerable information gleaned that is of large worth to the industry.

The Largest Fruit District.

The largest fruit districts are to be found in the counties of Ravalli, Missoula, Flathead, Yellowstone, Carbon, Park, Cascade, Gallatin and Jefferson, with some scattering orchards throughout the other counties. In nearly every portion of the state the small fruits, such as the bush fruits and vine fruits, are grown in abundance, but the planting of large orchards is confined, with few exceptions to the counties above mentioned. In the districts named there are at the present time in round numbers 1,650,000 fruit trees consisting of apples, pears, plums, prunes, cherries, peaches and apricots, the apple, of course, leading all other fruits. Generally speaking the people of the state are not aware that Montana is famous for its choice apples. They have been tested in the far east and to the west of us and pronounced by all to be perfect. Indeed, nowhere in the world can you go and view as fine orchards as you will in our state. They are well kept, are the pride of their owners and represent the best paying investment upon the farm. They are continually growing in wealth; each year sees them able to produce larger crops and it will be but a short time until the product of the late varieties will be great enough to bring to us the purchasers from all parts, to buy, pick and pack the crop for foreign markets.

Efforts of the Board to Keep Out Orchard Pests.

The board from its very inception has endeavored by every means at their command to keep out of our state all infected nursery stock and diseased fruits. In this they have found their hardest work. At no time have they lost sight of the fact that they must be ever at their duty. For the purpose of preventing the spread of contagious diseases from nursery to orchard, all trees imported into the state and grown within the state are required to be inspected and fumigated before delivery. All nursery stock found to be infected with disease is destroyed. Nurserymen throughout the land claim our law to be the strictest known, yet as they become better acquainted with its workings they admit its wisdom. To treat and inspect all the nursery stock imported into the state and also all that is grown within the state is no small labor, when it is understood that there was imported and grown for sale in the state during the last four years not less than 1,000,000 trees, besides the thousands of smaller plants.

Inspection of Fruits.

In all the important towns and counties of the state a rigid inspection of imported fruits has been kept up by the board. This



In the Bass orchard near Stevensville, Mont.



A corner in the Bass Bros. orchard near Stevensville, Mont.



A pretty bunch.

feature of the work is one of stupendous proportions, when it is considered that there was imported into the state from May 1, 1901, to Nov. 30, 1902, a period of nineteen months, the enormous number of 684,206 packages of fruit, or a total of about 34,210,300 pounds. During the same period there was inspected of Montana grown fruits 86,043 packages, or a total of about 4,302,150 pounds, making a grand total of imported and home-grown fruits inspected of 770,249 packages, or a total of 38,512,450 pounds of fruits. Of this total the city of Butte alone handled 441,469 packages, or 22,073,450 pounds. It should be borne in mind that the 86,043 packages of Montana fruits inspected does not represent her production. The product of the Montana orchards goes into all parts of the state and to places where the board has been unable, through lack of funds, to maintain inspection. As a consequence a complete record of the number of packages sold could not be secured. Then, too, the local consumption is not accounted for. It is, however, known through most careful estimates made by this office, assisted by the most experienced horticulturists, that Montana orchards produced during the year 1902 275,000 boxes of apples, and a fair crop of pears, plums, cherries and berries. It will be but a few years until the product of our orchards will supply the home market.

Adding to the totals of fruits imported into the state, the production of our home orchards and allowing ten per cent of this to cover importations and consumption not recorded would bring up the total consumption of fruits for the nineteen months to 51,381,300 pounds, or about 170 pounds for each individual in the state during the period above mentioned. Montana's fruit crop for 1902 represents at the lowest value over half a million dollars. The total value of the fruits consumed in the state during the nineteen months recorded is over \$3,000,000.

The inspection of fruits is looked after by special fruit inspectors and all fruits found to be infected with any injurious disease, liable to be disseminated throughout the orchards, are condemned. The good effect of this rigid inspection is seen in all the important markets in the state. At the present time fruits are being shipped to us from various sections of the country under guarantee as to their freedom from dangerous diseases. In many instances they have been inspected by the inspectors of the localities from whence they were shipped. In such cases a certificate of inspection accompanies the invoice. California, Oregon, Washington and Idaho, the states which import most of our fruits, have found it

necessary to take active steps looking to the eradication of disease from their orchards owing to the stringency of our horticultural law in order to hold this market.

Personnelle of the Board.

At the present time the members and officers of the board are: Governor Joseph K. Toole, Helena; Mr. Olney Taylor, Park City; Mr. E. N. Brandegee, Helena; Mr. Charles H. Campbell, Great Falls; Mr. C. M. Allen, Lo Lo; Mr. J. H. Edwards, Kalispell; Mr. E. N. Brandegee, Helena, inspector-at-large for the state, and Charles H. Edwards, Butte, secretary. Orchard and fruit inspectors: I. D. O'Donnell, Billings; H. C. Gardnier, Bozeman; Chas. H. Edwards, Butte and Anaconda; E. N. Brandegee, Helena; A. S. Johnson, Dillon; C. E. Hubbard, Great Falls; Henry O. Wilson, Chinook; W. D. Luther, Glasgow; E. M. Tucker, Missoula; W. B. Harlan, Como; O. C. Estey, Big Fork; O. A. Parsons, Kalispell.

It will be readily recognized by all that the board has a large field to cover; that it will continue to safeguard the orchards of the state none need question, and if given the intelligent aid of the individual orchardist, Montana will continue to be the only district in the United States producing fruit free from all disease and blight.

Following is a tabulated report of fruits inspected in the state from May 1, 1901, to Nov. 30, 1902, showing varieties and amounts as received from the various states in each of the horticultural districts :

FRUITS INSPECTED IN BUTTE ALONE, IN DISTRICT NO. 2, SHOWING VARIETIES AND WHEREFROM FROM MAY 1, 1901, TO NOVEMBER 30, 1902.

	Apples	Pears	Apricots and Peaches	Totals
California	44,402	12,457	47,377	
Oregon	13,438	2,302	1,338	
Washington	47,332	4,345	11,335	
Idaho	7,983	1,635	892	
Utah	83	465	5,610	
Montana	52,129	10		
Michigan				
New York				
Total	165,367	21,214	66,552	253,133
	Plums and Prunes	Cherries	Quinces	Totals
California	26,426	2,485	357	
Oregon	1,084	2,386		
Washington	9,425	3,579		
Idaho	1,622	1,192		
Utah	2,594	1,980		
Montana	431	153		
Michigan				
New York				
Total	41,582	11,775	357	53,714
	Oranges	Lemons	Grapes	Totals
California	27,676	13,274	49,689	
Oregon			139	
Washington		25	5,776	
Idaho			320	
Utah			58	
Montana				
Michigan			9,000	
New York			1,000	
Total	27,676	13,299	65,982	106,957
	Berries	Miscellaneous		Totals
California	11,375			
Oregon	2,608	32		
Washington	6,115	32		
Idaho	1,111	43		
Utah	3,271	34		
Montana	2,973	66		
Michigan				
New York				
Total	27,458	207		27,665
Grand Total				441,469

FRUITS INSPECTED IN DISTRICT NO. 2, SHOWING VARIETIES AND
WHEREFROM FROM MAY 1, 1901, TO NOV. 30, 1902.

	Apples	Pears	Apricots and Peaches	Totals
California	69,619	16,237	76,312	
Oregon	17,575	4,654	2,770	
Washington	63,442	6,530	15,300	
Idaho	12,307	2,436	1,354	
Utah	295	849	11,712	
Montana	71,173	10		
Michigan				
New York				
Total	234,411	30,716	107,448	372,575
	Plums and Prunes	Cherries	Quinces	Totals
California	36,275	4,569	699	
Oregon	3,524	2,416		
Washington	13,429	4,128	25	
Idaho	2,347	1,392		
Utah	4,245	1,980		
Montana	806	153		
Michigan				
Total	60,626	14,638	724	75,988
	Oranges	Lemons	Grapes	Totals
California	45,408	22,518	49,701	
Oregon			238	
Washington		25	5,776	
Idaho			320	
Utah			58	
Montana				
Michigan			9,000	
New York			1,000	
Mexico	300			
Total	45,708	22,543	63,093	131,344
	Berries	Miscellan- eous		Totals
California	11,375			
Oregon	2,608	32		
Washington	6,115	32		
Idaho	1,111	43		
Utah	3,271	34		
Montana	2,978	66		
Total	27,458	207		27,665
Grand Total				607,572

FRUITS INSPECTED IN DISTRICT NO. 3, SHOWING VARIETIES AND
WHERE FROM FROM MAY 1, 1901, TO NOV. 30, 1902.

	Apples	Pears	Apricots and Peaches	Totals
California	8,769	2,775	16,106	
Oregon	4,733	1,810	10	
Washington	32,614	1,191	1,615	
Idaho	4,670	165	68	
Utah	50	87	2,400	
Montana	2,017	.....	.....
Total	52,853	6,028	20,199	79,080
	Plums and Prunes	Cherries	Quinces	Totals
California	6,276	799	.....
Oregon	89	39	.....
Washington	4,644	1,905	.....
Idaho	253	77	.....
Utah	1,016	.....	.....
Total	12,283	2,820	.....	15,103
	Oranges	Lemons	Grapes	Totals
California	10,726	4,587	194	
Oregon .....	.....	.....	.....
Washington	15	20	.....
Idaho .....	.....	.....	.....
Total	10,741	4,607	194	15,542
	Berries	Miscellan- eous		Totals
California	979	.....	.....
Oregon .....	.....	.....	.....
Washington .....	.....	.....	.....
Idaho	2	.....	.....
Total	981	.....	.....	981
Grand Total .....	.....	.....	.....	110,706

SECOND BIENNIAL REPORT OF THE

FRUITS INSPECTED IN DISTRICT NO. 4, SHOWING VARIETIES AND
WHERE FROM, FROM MAY 1, 1901, TO NOV. 30, 1902.

	Apples	Pears	Aprico's and Peaches	Totals
California .....	.....	.....	101	
Washington	1,153	373	2,962	
Idaho	18	490	2,108	
Montana	8,390	107	.....
Total	9,561	970	5,171	15,702
	Plums and Prunes	Cherries	Quinces	Totals
California .....	.....	21	.....
Oregon .....	.....	21	.....
Washington	1,190	638	.....
Idaho	304	445	.....
Montana	343	.....	.....
Total	1,837	1,125	.....	2,962
	Oranges	Lemons	Grapes	Totals
California	104	186	.....
Washington .....	.....	.....	49	
Total	104	186	49	339
Grand Total .....	.....	.....	.....	19,003

FRUITS INSPECTED IN DISTRICT NO. 5, SHOWING VARIETIES AND
WHERE FROM, FROM MAY 1, 1901 TO NOV. 30, 1902.

	Apples	Pears	Apricots and Peaches	Totals
California	1,005	88	.....
Washington	13,251	1,271	5,844	
Idaho	46	178	606	
Total	14,302	1,537	6,450	22,289
	Plums and Prunes	Cherries	Quinces	Totals
Washington	2,606	370	12	
Idaho	293	115	.....
Total	2,899	985	12	3,996
	Oranges	Lemons	Grapes	Totals
California	1,029	596	.....
Washington	84	.....	80	
Total	1,113	596	80	1,789

	Berries	Miscellaneous	
Washington	124	.....	.....
Total	124	.....	124
Grand Total .....	.....	.....	28,098

RECAPITULATION OF FRUITS INSPECTED, SHOWING TOTAL OF EACH VARIETY RECEIVED FROM VARIOUS STATES.

	Apples	Pears	Apricots and Peaches	Totals
California	79,393	19,100	92,519	
Oregon.....	22,308	5,464	2,780	
Washington	110,460	9,365	25,721	
Idaho	17,041	3,269	4,136	
Utah	345	936	14,112	
Montana	81,580	117	.....
Michigan .....	.....	.....	.....
Total	311,127	38,251	139,268	488,646

	Plums and Prunes	Cherries	Quinces	Totals
California	42,551	5,389	699	
Oregon.....	3,613	2,476	.....
Washington	21,869	7,541	37	
Idaho	3,202	2,029	.....
Utah	5,261	1,980	.....
Montana	1,149	153	.....
Michigan .....	.....	.....	.....
Total	77,645	19,568	736	97,949

	Oranges	Lemons	Grapes	Totals
California	55,267	27,887	49,895	
Oregon.....	.....	.....	238	
Washington	99	45	5,905	
Idaho .....	.....	.....	320	
Utah .....	.....	.....	58	
Montana .....	.....	.....	.....
Michigan .....	.....	.....	9,000	
New York .....	.....	.....	1,000	
Mexico	300	.....	.....
Total	55,666	27,932	66,416	150,014

	Berries	Miscellan- eous	Misc. Scat- tering	
California	12,354	.....	.....
Oregon....	2,608	32	.....
Washington	6,239	32	.....
Idaho	1,113	43	.....
Utah	3,271	34	.....
Montana	2,978	66	.....
Michigan .....	.....	.....	.....
Total	28,563	207	.....	28,770
Grand Total .....	.....	.....	.....	765,379
Miscellaneous fruits inspected in District No. 1, not reported by states .....	.....	.....	.....	4,870
Grand Total of Packages .....	.....	.....	.....	770,249

TABLE OF FRUITS CONDEMNED IN THE STATE FROM MAY 1, 1901, TO NOV.
30, 1902.

DISTRICT NO. 2.

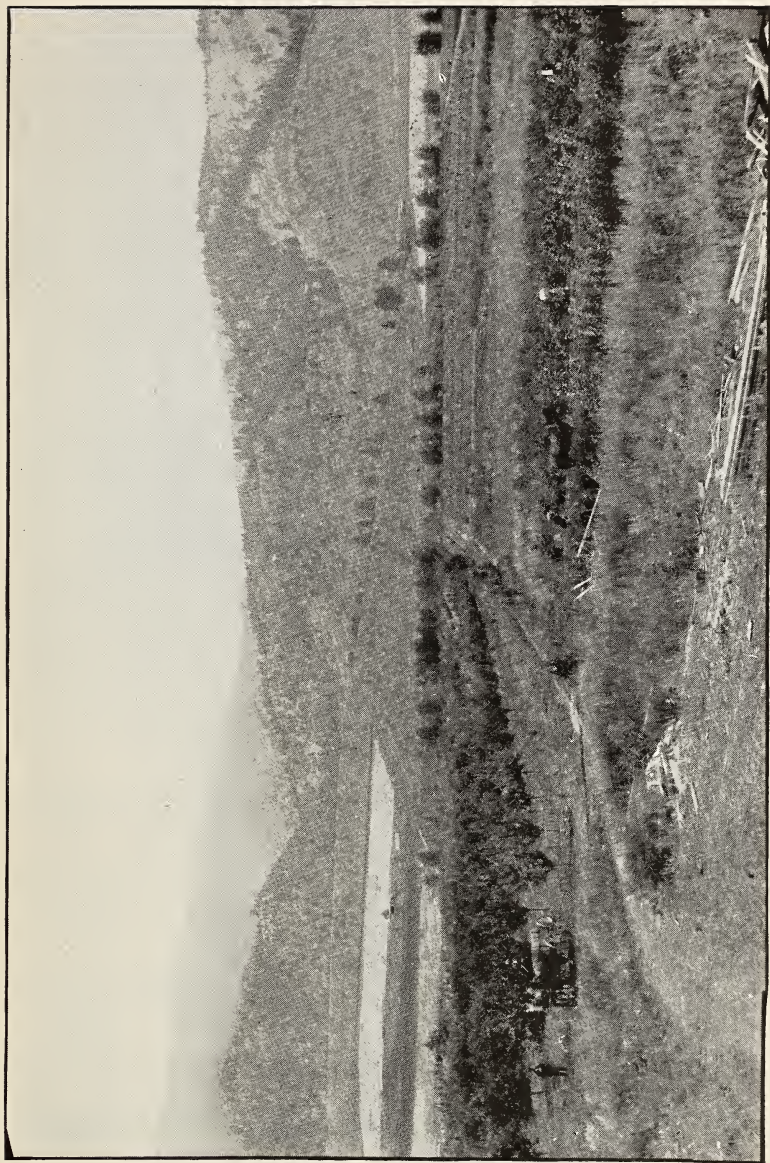
	Apples	Pears	Peaches	Totals
California	178	39	9	
Oregon....	112	213	.....
Washington	214	5	42	
Idaho	823	46	.....
Utah	24	223	.....
Nebraska	500	.....	.....
Total	1,851	526	51	2,428

DISTRICT NO. 2.

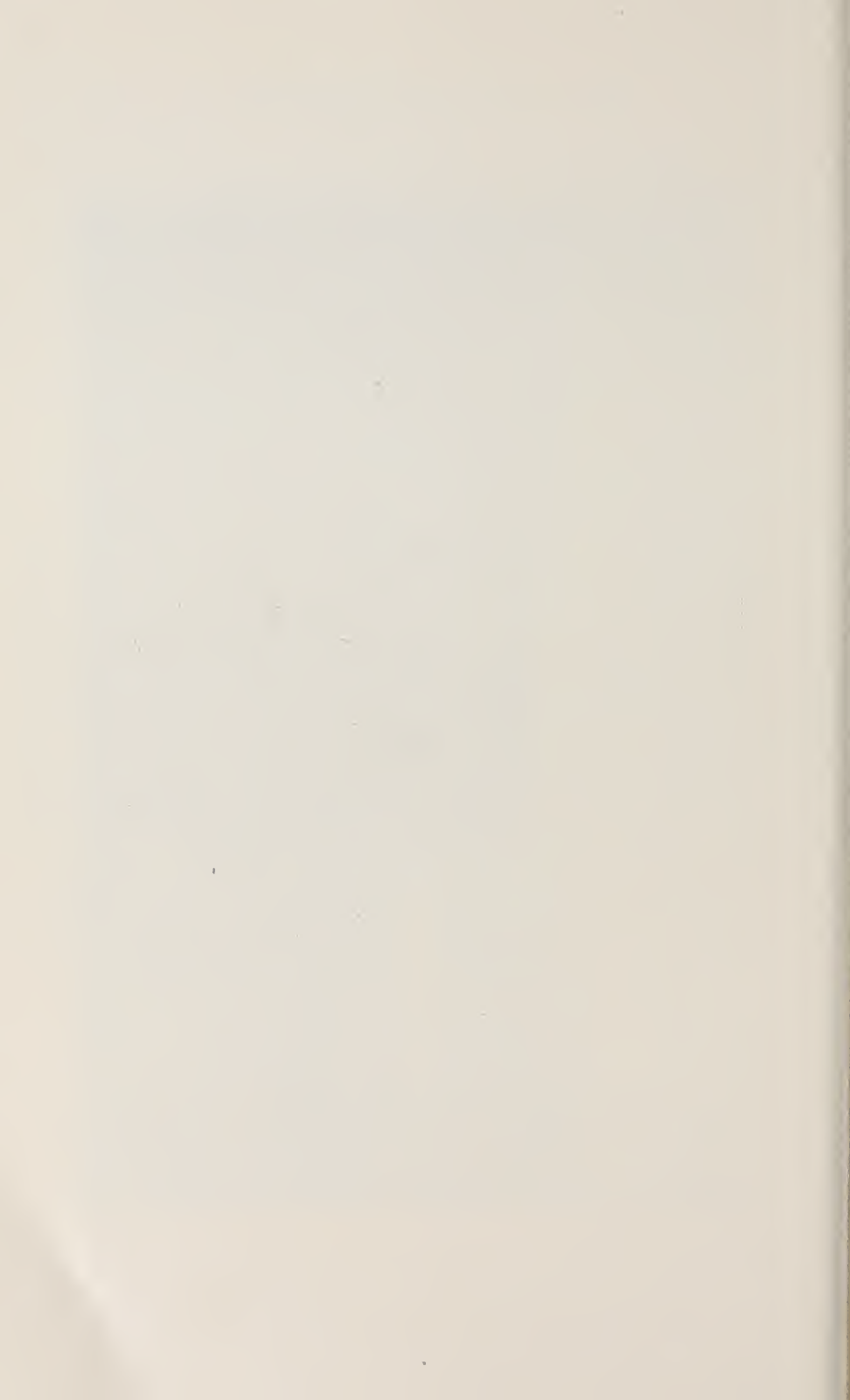
	Cherries	Berries	Miscellan- eous	Totals
California .....	.....	.....	.....
Oregon....	.....	.....	.....
Washington	22	.....	.....
Idaho .....	.....	.....	.....
Utah .....	.....	.....	.....
Total	22	.....	.....	22

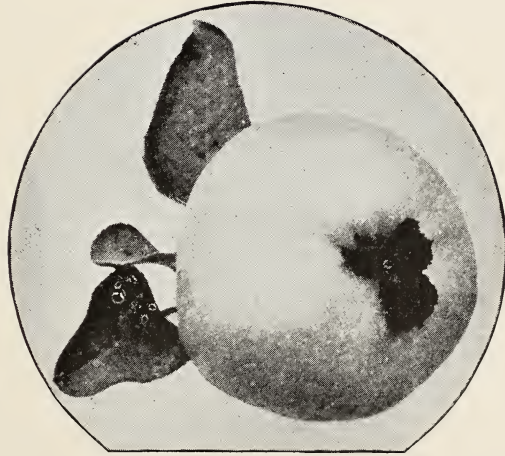
DISTRICT NO. 3.

	Apples	Pears	Peaches	Totals
California	130	68	224	
Washington	201	.....	.....
Total	331	68	224	623



Orchard of T. A. McClain, Carlton, Mont.

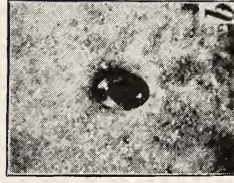
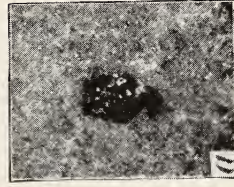




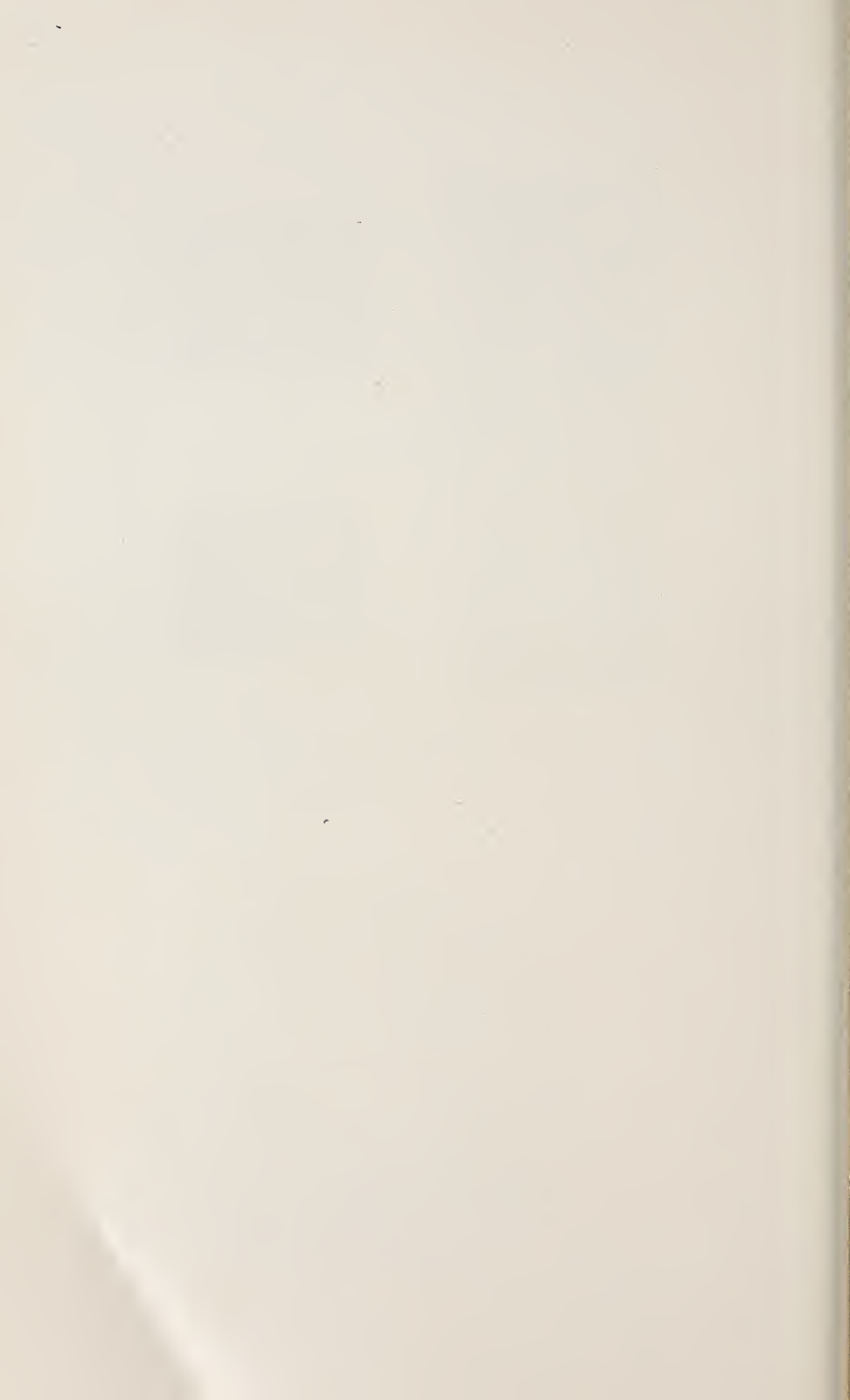
Codling moth. Characteristic work in apple.



Larva of Codling moth, magnified.



Codling moth. From 1900 Oregon Board Horticulture.



DISTRICT NO. 4.

	Apples	Pears	Peaches	Totals
Washington	12	87	7	
Idaho	10	39	.....
Total	22	120	7	149

DISTRICT NO. 5.

	Apples	Pears	Peaches	Totals
Washington	10	88	33	131

DISTRICT NO. 5.

	Cherries	Berries		Totals
Washington	1	12	.....	13
Grand Total .....	.....	.....	.....	3,366

TOTAL FRUITS CONDEMNED, SHOWING STATES FROM AND VARIETIES

	Apples	Pears	Peaches	Totals
California	308	107	233	
Oregon	112	213	.....
Washington	437	174	82	
Idaho	833	85	.....
Utah	24	223	.....
Nebraska	500	.....	.....
Total	2,214	802	315	3,331

	Cherries	Berries	Miscellaneous	Totals
California .....	.....	.....	.....
Oregon .....	.....	.....	.....
Washington	23	12	.....
Idaho .....	.....	.....	.....
Utah .....	.....	.....	.....
Total	23	12	.....	35
Grand Total of all Fruits Condemned in the States .....	.....	.....	.....	3,366

Of this total over 2,000 packages were condemned in Butte.

The Necessity for Inspection.

To a great many people the inspection of fruits, especially when it is carried on in a section of country like Butte, seems entirely needless, and the efforts of the fruit inspector to keep out all diseased fruits are sneered at by the ignorant and by those who should know better, but who have never given the subject any thought. It is stated by persons eminently qualified to speak that the majority of the diseases to which fruits are subjected to, are spread from district to district and from country to country by the distribution of fruits. For instance: The San Jose scale, discovered in the far east, was traced from California and it is said that it was carried upon some pears imported from California and that the careless throwing of a single uneaten portion of a pear from a passenger coach window into the corner of an orchard was the starting point of that disease, which has caused the eastern states to spend hundreds of thousands of dollars to simply hold it in check. Instances of this kind are numerous. We have examples of them at home. The practice of using old second-hand fruit boxes by the fruit growers to pack their product in has brought into our midst foreign pests; the packages used for the importation of nursery stock, carelessly allowed to remain in and around the orchards, is another fruitful source for disseminating orchard diseases. Butte, Helena, Great Falls, Bozeman, Livingston, Billings are all large distributing points. Large quantities of fruits are received at these places to be repacked and shipped again to many sections of the state where orchards are found, consequently it is as important that the inspection of fruits be as rigid in these points as at places situated in the very center of the fruit belts.

Benefits to the Consumer and Grower.

The orchardists of Montana are not the only persons benefited by the inspection of fruits. The consumer is protected from the necessity of purchasing fruits diseased, thereby securing clean and wholesome fruits. The grower and packer who seeks to sell his product in our state is protected in the sale of his fruits. He knows that when he has given care to his orchard, endeavored to keep it free from all diseases, aimed to pick and pack only clean and good fruits that when he comes to our market with his stock free from all disease, the results of honest effort, that he will not be compelled to place his goods in competition with the worm-eaten, scab-covered fruits of the negligent grower. A few days ago we received a visit from a fruit grower from the state of Washington who had shipped a car of fancy apples to this city which

had been inspected and passed, as the same were found free of any and all diseases. He was free in his appreciation of our law. Declared it the best fruit law in existence and said that he wished that every state in the union would establish the same stringent laws that are in force in this state.

Do Business Men Like the Law?

It is universally conceded by all progressive business men that the law is a good one; that the inspection of fruits has secured for them a cleaner market, guaranteeing to them a better profit and has made the handling of fruits decidedly more satisfactory. They concede that 95 per cent of their stock comes to them clean, thus assuring the keeping qualities. They would not go back to the old methods, back to the point where Montana was made the dumping grounds for all worthless fruits.

A comparison of the fruits offered for sale in the markets of the states of Oregon, Washington, Idaho and Utah with those offered for sale within our state will prove the efficiency of our law. The observer will conclude that the grower, dealer and consumer are well protected through the inspection law. It is, of course, a physical impossibility for any inspector, be he ever so careful, to detect each and every package of fruit that may be diseased, especially when we consider the vast quantities to be inspected, yet for the short time that the law has been in force a great work has been accomplished and the danger of infesting Montana orchards greatly reduced.

FEE FUND RECEIPTS FROM APRIL 1, 1901, TO DECEMBER 31, 1902.

Amount Received—		
Fruit Fees	5,826 10	
Nursery Fees	136 85	
Fumigation Fees	433 00	
		6,395 95

FEE FUND DISBURSEMENTS FROM APRIL 1, 1901 TO DECEMBER 31, 1902.

Amount Disbursed to—		
Freight, Express and Transfer	100 00	
Wages	5,323 17	
Office Expense, Etc.....	719 06	
		6,147 23
Traveling Expense.....		156 90
		6,304 13
Grand Total		91 82
Balance on hand		\$6,395 95

DISBURSEMENT OF APPROPRIATION FUND, MARCH, 1901, TO SEPTEMBER 10, 1902.

General Expense	2,084 02	
Expense 1st District	88 45	
Expense 2nd District	143 37	
		2,315 84
Expense 3rd District	337 40	
Expense 4th District	2,300 41	
Expense 5th District	546 35	
		3,184 16
Total		5,500 00
Appropriation for two years		5,500 00
		\$5,500 00
Bills due and unpaid against appropriation		898 75

The Nurseries of Montana.

After success had crowned the efforts of the early pioneers in horticultural work, then came the establishment of nurseries.

The first nursery started in the state was in the Bitter Root valley, a very natural point, as it was in the Bitter Root valley that fruit culture had its true beginning. Following the beginning made there came the locating of nurseries in Missoula county, Lewis and Clarke county, Flathead county and Cascade county, until today there are ten nurseries in the state growing many hundreds of thousands of trees and millions of shrubs, plants, vines and flowers.

Montana Grown Trees for Montana Orchards.

Montana grown trees, plants, shrubs and seeds for Montana orchards and gardens should be the by-word of all Montana fruit growers and farmers. The successful growing of all nursery stock is no longer an experiment. Our nurserymen have passed that stage and are now upon the highway of success. It should require no argument to prove to any thinking fruit grower or gardener that the home-grown stock is best. We all know that the nearer we get to the nativity of a plant, the better we find it. This is true of all life. There are many reasons why a Montana-grown nursery tree or plant is more valuable than the imported. One is the fact that the stock has been grown under the same climatic conditions under which it is to spend its life; another, the freedom of our home-grown trees and plants from dangerous diseases. These two reasons should determine the preference of intending purchasers for Montana nursery stock. Then, too, we should consider the fact that by purchasing trees and plants grown at home that we are giving employment to our own people and saving money to our state. The amount expended annually in Montana for nursery stock runs into the hundreds of thousands of dollars. This could nearly all be kept at home to increase our own revenues.

In Ravalli county there are three nurseries; one at Woodside, one at Victor and one at Stevensville. The Woodside nursery is owned by Mr. John Sears, one of the most practical fruit growers in Montana. This place consists of several acres, devoted chiefly to the propagation of fruit trees. There one will find all of the varieties of fruit trees best adapted to the state. Mr. Sears is the possessor of one of the finest orchards in the state and all his nursery stock is propagated from trees that have amply demonstrated their value for planting.

At Victor we find Mr. S. P. Kerr, an old and experienced nurseryman, growing thousands of the finest trees to be found in the northwest. The situation of Mr. Kerr's nursery is the best that could be found. There the intending purchaser will find trees and plants grown with the greatest care as to their future worth, and he will be able to note the difference between imported stock and those grown at home.

Mr. H. Raymond, at Stevensville, propagates thousands of trees. He has found from long experience the value of native trees. Upon his grounds the horticulturist will find varieties of well known merit. The greatest possible care is used in the selection of scions. They are taken only from trees that have fruited and proven their ability to do well in this country.

In Missoula county we have three nurseries, one each at Carlton, Plains and Missoula.

At Plains Mr. Isaac Sears has for years grown large numbers of apple, pear, apricot, cherry and plum trees and he has met with good success in his work. Long ago he found out that if he wanted trees true to name and with the vitality necessary to produce well that they must be grown at home. This led him into the work of growing nursery stock and today he has a nursery from which one can select a good orchard.

T. A. McClain, proprietor of the Home Nursery, located at Carlton, came to the Bitter Root valley some twenty years ago and began setting out an orchard. After a few years of experience he concluded that to get the best trees he must propagate them in this section and he commenced the work of establishing a nursery. Finding conditions favorable to the work he branched out into a general nursery business and then and there laid the foundation of what has since proven a lucrative trade. Today there is upon the Home Nursery grounds over 150,000 trees and about 200,000 young grafts. All of the leading varieties of apple, pear, plum, cherry and apricot trees will be found, also many

thousands of vines and plants, strawberries, blackberries and raspberries. All stock grown will be found true to name and as represented. Mt. McClain owns a very fine and productive orchard in which all varieties are tested before being placed in the nursery.

The Missoula nurseries and green houses, owned by Messrs. Dinsmore and Dallman, located about one mile south of Missoula, cover about forty-five acres and contain about 300,000 fruit trees, consisting of the best varieties of apple, pear, plum, apricot and cherry, with some peach stock, 20,000 shade trees of such well-adapted varieties as Carolina poplars, Canada poplars and Balm of Gilead, 5,000 ornamental trees, 20,000 blackberries and raspberries and 500,000 shrubs, plants and vines. The trade of this concern now extends to the Pacific. Large, modern greenhouses in which are grown all manner of flowers, palms, bulbs and vines are located upon the nursery grounds. Flowers and plants are distributed to all parts of the state from them. A flower sales-room is kept in Missoula. This plant is among the most modern and is equipped with every convenience for handling the large and ever increasing trade which the company enjoy. Five salesmen are kept on the road throughout the year and from thirty to forty persons are employed in the nursery. Testing grounds are maintained where all plants and trees are tested before being propagated. Mr. Dallman, the manager, is an expert horticulturist and florist. He has made a life study of the subjects and has had experience both in Europe as well as in this country.

In the city of Helena, near the famous Broadwater Natatorium, is located the State Nursery, owned by the State Nursery Co. This company began business in the year 1890 and its growth has been phenomenal. Upon the grounds of this concern, which cover many acres, will be found all of the hardiest of trees and plants; ornamental trees and shrubs; palms, bulbs and flowers, and seeds of every description. Over one acre is devoted to the propagation of roses. All of the best varieties of fruit trees are grown and the product is being increased each year. A careful study of soil and climatic conditions prevailing throughout Montana has given to this company an opportunity to decide the needs of the people in the nursery line. The greatest care has been exercised to insure none but the highest standards in all propagation of shade, ornamental and fruit trees. Lately there has been added to the already very large plant a seed department, and it has proven a decided success. Every variety of seed needed in the state is

grown here and before they are offered for sale all are tested as to their vitality. In this work the managers have profited by their observations and have been able to discard all worthless seeds and plants. The greenhouses are among the largest to be found in the northwest. Starting in 1890 with only 600 square feet of glass they have grown and increased year by year until to-day over 80,000 square feet is used. Imagine, if you can, what 80,000 square feet of greenhouses filled with the most beautiful plants and flowers means. It is a sight worth going miles to see and a reminder of what the Great Artist has done for us.

In Flathead county there are two good nurseries. The one located at Big Fork is owned by Mr. Amos Estey and is a model propagating ground. It covers some fifteen acres of land and there are growing upon the place at this time about 175,000 trees, consisting of well tested apple, pear, cherry and plum. Here, too, are propagated all of the shrubs, plants, vines and small bush fruits. All fruit trees are grown from scions taken from fruiting trees that have proven their ability to stand our climate and bear choice fruits. Mr. Estey is numbered among Montana's leading horticulturists. His experience has been long and varied and he knows the needs of the Flathead section. The fruit growers of Flathead county appreciate their nursery, as it gives them a wide selection of fruits and enables them to secure good reliable stock at their own doors. Flathead county is young in the business of growing fruits, but it is destined to become one of the greatest fruit sections in Montana.

The Chapman nursery, the oldest in the county, is located at Holt. Mr. Chapman, the proprietor, is a very thorough, practical horticulturist. He began the work of growing nursery stock many years ago. He has succeeded in building up a large trade and his grounds show the results of thought and care. He has growing in the nursery row about 10,000 young trees of reputed value and many thousands of plants and vines. A practical education along fruit lines has enabled him to entirely free his nursery of all worthless varieties of plants and trees. From a splendid orchard of his planting he secures such scions as have proven good and true and with them he can assure the planter stock true to name and of the highest value for Montana.

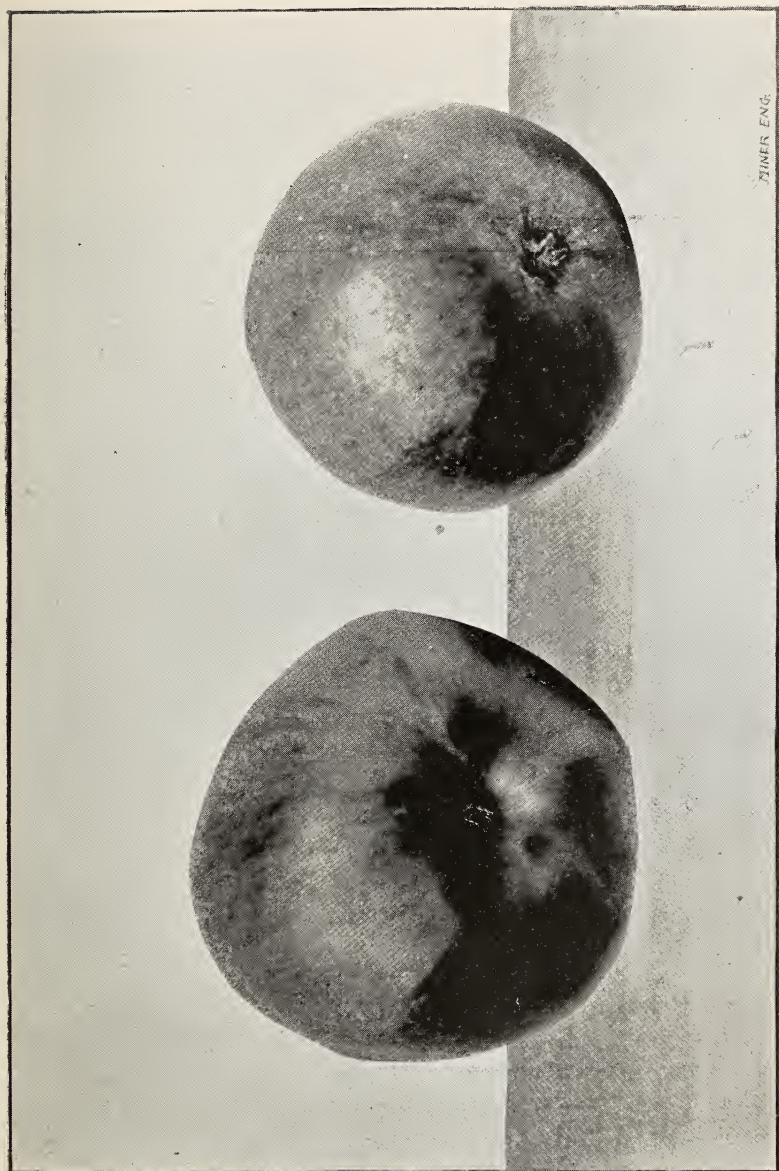
In the city of Great Falls is located the City Nursery. This nursery is the property of the city and is devoted to the growing of shade trees almost exclusively. Upon its grounds there are growing 10,000 elm, 9,000 ash and 1,000 maple trees. They are

as fine a body of shade trees as can be found in any country. The city owns the nursery for the purpose of growing its own shade trees. Great Falls has over nine miles of boulevarded streets, bordered with 5,225 beautiful trees. It is a most commendable work and should be followed by all cities of Montana.

The nursery business in Montana is young. It might be said to have only started, yet we are able to say, from a long acquaintance with those engaged in the work and from comparison with other sections that nowhere can better nursery stock be found than may be had in any Montana nursery. One of the great evils in vogue among eastern nurserymen is the unjust practice of substituting varieties. Every fruit grower knows what this means. This injurious method has cost the horticulturists of Montana hundreds of thousands of dollars and many years of labor. We do not believe that any nurseryman in Montana is guilty of this practice and we trust they will never begin it. With this fact established, with absolute guarantee of receiving stock free from disease, and the knowledge that the stock is better for the reason that the same is grown under the conditions which it is expected to live in, we see no reason for Montana going out of the state for nursery stock.

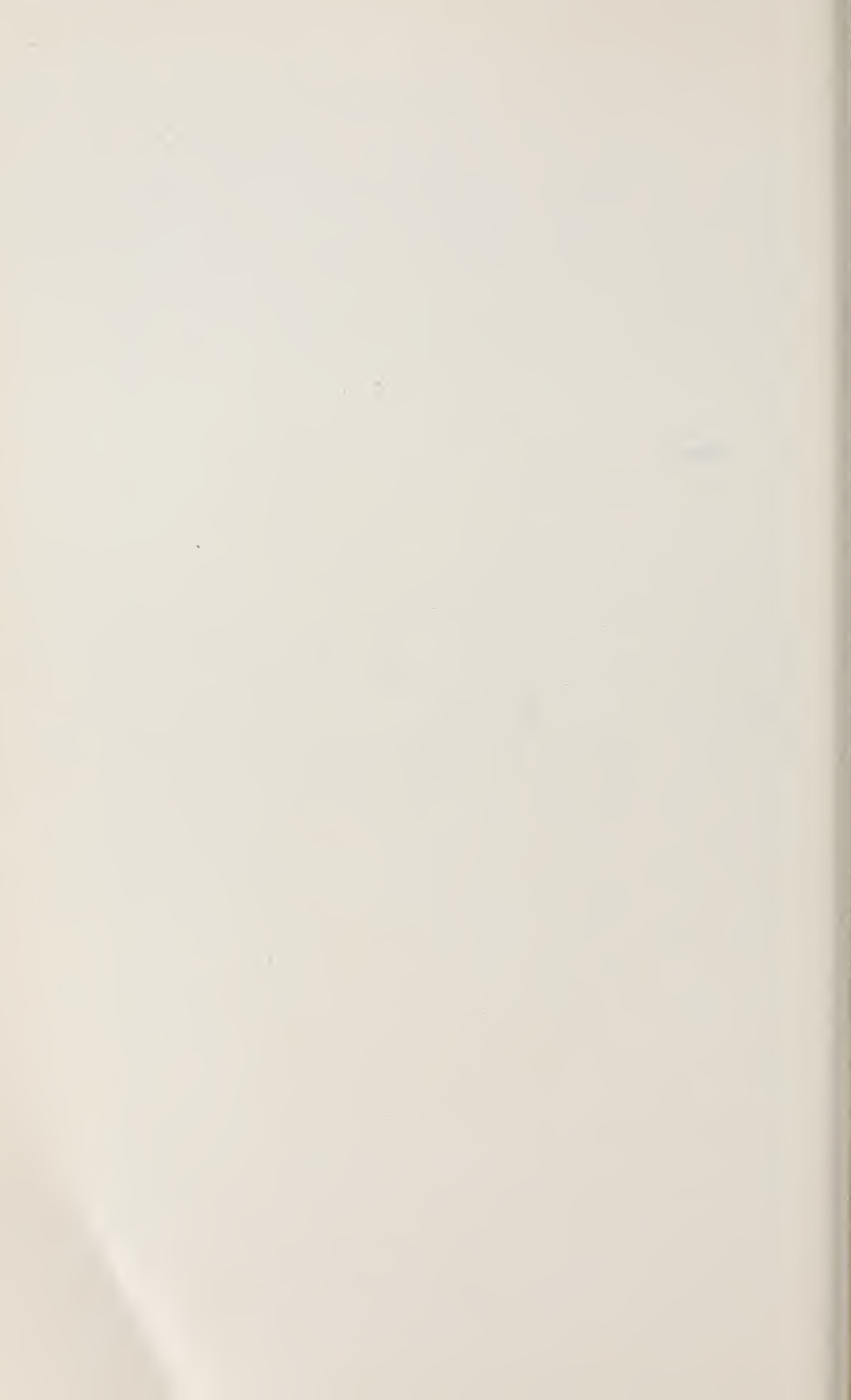
Interesting Matters Gleaned From Inspectors' Reports.

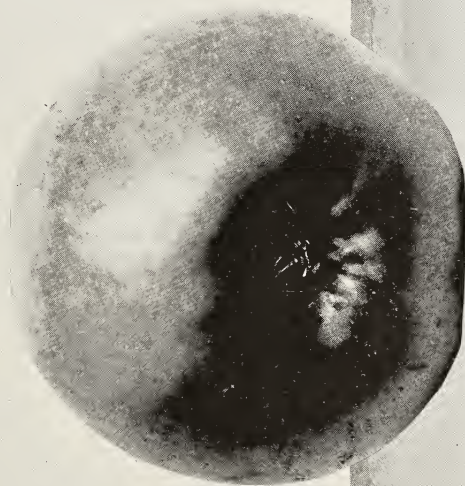
The following information is gleaned from the reports of orchard inspection made in the First district by Mr. Olney Taylor: The First district is comprised of the counties of Dawson, Custer, Yellowstone, Sweet Grass, Carbon and Park. Number of apple trees inspected, 13,146; number of plum and prune trees inspected, 2,121; number of pear trees inspected, 155; number of cherry trees inspected, 535. Total trees inspected, 15,957. Total acres of strawberries inspected, 23 3-40; total acres of all small fruits, 5 11-24; estimated number of fruit trees in the district, 60,000; cases of injurious insects found, 2—codling moth and wooly aphis; per cent of orchards in sandy soil, 67; clay loam, 27; gravel soil, 6; varieties of apples grown in the district, Summer, Yellow Transparent, Tetofsky, Red Astrachan, Early Harvest, Autumn, Dutchess, Pear Apple, Orange Pippin, Early Winter, Wealthy Alexander, Wolf River, Famouse, Bismarck, Hass, Kinnard and Jelforis; winter, Ben Davis, Rome Beauty, Jonathan, Winter Maiden Blush, Walbridge, Longfield, Northern Spy, Bellefleur, King, Gano, Salome, N. W. Greening, M. Blk. Twig, Aikin, Apple of Commerce, Winesap, Wagner, Missouri Pippin, Pewaukee, McIntosh Red, Peter, Geneton, Gideon, Pattins Greening.



WOLF RIVER. Large showy apple, does well in Montana.
Early winter.

DELAWARE RED (Lawver). Medium size, good keeper.
Season very late.





N. W. GREENING. Color green, poor flavor, tree hardy, not a good keeper discarded in the Flathead.)



W ALBRIDGE. Medium size, color fair, late keeper, tree hardy.

JINER ENG.



Varieties of crab apples, Martha, Whitney and Transcendent.

For hardiness of tree the following varieties have been reported: Ben Davis, Wealthy, Duchess, Yellow Transparent and Gano.

For owners' choice of variety, Wealthy, Transparent and Duchess are named.

For hardiness of fruit bud, Duchess, Longfield, Yellow Transparent and Gano are selected.

From an orchardist who reports having set out 1,250 apple trees, the following information is gleaned: For hardiness of tree, Wolf River, 100 per cent; Jonathan, 100; N. W. Greening, 100; Yellow Transparent, 90; Maiden Blush, 90; Alexander, 90; Famouse, 70; Walbridge, 60; Duchess, 60; Salome, 60; Gano, 50.

Choice of variety, Wealthy is selected.

The orchard is located in Carbon county, is upon sandy soil, sub-irrigated and the situation is east. The bark on some trees was found to have been injured, but the roots and tops were healthy.

The total number of orchards inspected in the district was 37.

The following information is gleaned from the compiled statistics taken from the reports of Mr. W. B. Harlan, Inspector for the Fourth District. The Territory inspected lies in the Bitter Root Valley south of Carlton.

Number of Orchards inspected.....	161
Orchards sloping to the East	54 per cent.
Orchards sloping to the Northeast	7 per cent.
Orchards sloping to the West	14 per cent.
Orchards sloping to the South.....	5 per cent.
Orchards upon level lands	20 per cent.

Soils given are Sandy loam, Granite, Gravel, Loam, Slate and Gravel, and Sandy and run in per cent in the order named.

Highest elevation above river is given at 300 feet and the lowest 15 feet.

Orchards reported in good cultivation	45 per cent.
Orchards reported in poor cultivation.....	30 per cent.
Orchards reported in fair cultivation	15 per cent.
Orchards reported with no cultivation	10 per cent.
Orchards reported in good condition	55 per cent.
Orchards reported in poor condition	28 per cent.
Orchards reported in fair condition	17 per cent.

Diseases found, Pear Leaf Blister Mite and Oyster Shell Bark Louse.

Varieties of Apples selected were as follows, each being highest in the order named: Wealthy, Alexander, Duchess, Shackelford, McIntosh, Jonathan, Peter, Antcnovka, Boiken, Snow, King, Baldwin and Walbridge.

Total number of apple trees inspected.....	258,550
Total number of plum and prune trees inspected	6,530
Total number of pear trees inspected	5,190
Total number of cherry trees inspected.....	4,920
Total number of peach and apricot trees inspected	350

Total of all trees inspected	275,540
Total acres of strawberries inspected	6¾
Total number of acres of blackberries inspected	1¾
Total acres of raspberries inspected	½
Total acres of all other small fruits inspected	4½

Total acres of all small fruits inspected 13½

From the reports of Inspector J. O. Read, for the Fourth District, embracing the territory of Missoula County, the following information is taken.

Number of orchards inspected 114
Elevation above river is from river level to 75 feet.

The soils given are Gravel, Black Loam and Sandy, being highest in the order named.

Cultivation of orchards is generally clean, some being in garden crop.

Total number of apple trees inspected.....	81,719
Total number of plum and prune trees inspected	2,132
Total number of pear trees inspected	1,984
Total number of cherry trees inspected	2,546
Total number of peach and apricot trees inspected	23

Total of all fruit trees inspected	88,404
Total acres of strawberries inspected.....	13 61-80
Total acres of blackberries inspected	1 11-16
Total acres of raspberries inspected	4 51-80

Total acres of all berries and small fruits inspected	20 7-80
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DISEASES AND FUNGI PESTS FOUND:

Apple Worm, 2; Pear leaf blister mite, 12; Codling Moth, 19; Strawberry Weevil, 4; Strawberry Beetle, 2; Oyster Shell Bark Louse, 5; also some Caterpillars, Borers and Currant Worms.

Orchards in good condition	62 per cent.
Orchards in fair condition	20 per cent.
Orchards in bad condition	18 per cent.

The varieties selected and receiving the highest votes are here given in their order:

Wealthy, McIntosh, D. Red, N. Spy, Alexander, Black Twig, Ben Davis, Baldwin, Wolf River, Yellow Transparent, Duchess, King and Bismarck.

From the report of Inspector O. C. Estey, of the Fifth District, the following information is compiled:

Total orchards inspected	282
Total bearing apples trees	16,098
Total non-bearing apple trees.....	54,469

Total apple trees	70,567
Total bearing plum trees	1,532
Total non-bearing plum trees	3,295

Total plum trees	4,827
Total bearing pear trees	346
Total non-bearing pear trees	1,451

Total pear trees	1,797
Total bearing cherries	1,925
Total non-bearing cherries	2,495
	4,420

Total cherry trees	
Total bearing peach and apricot trees	32
Total non-bearing peach and apricot trees.....	55

Total peach and apricot trees.....	87
------------------------------------	----

Total of all trees inspected	81,698
Total Strawberries	17 5-6
Total Blackberries	3 3-16
Total Raspberries	12 7-24
Total of all other small fruits	17 13-48

Total Acres of Berries and other Small Fruits	50 7-12
Orchards upon level land	35 per cent.
Orchards sloping to East	25 per cent.
Orchards sloping to West	17 per cent.
Orchards sloping to North	8 per cent.
Orchards sloping to South	7 per cent.
Orchards sloping to Southwest	3 per cent.
Orchards sloping to Northeast	2 per cent.
Orchards sloping to Northwest	2 per cent.
Orchards sloping to Southeast	1 per cent.

Highest Elevation above River reported.....	300 feet
Lowest Elevation above River reported.....	20 feet
Orchards reported in Black loam soil .....	.25 per cent.
Orchards reported in Sandy soil.....	.20 per cent.
Orchards reported in Gravel soil .....	.17 per cent.
Orchards reported in Gravely loam .....	.12 per cent.
Orchards reported in Sandy loam .....	.8 per cent.
Orchards reported in Clay soil.....	.7 per cent.
Orchards reported in Clay and Gravel soil.....	.6 per cent.
Orchards reported in Rocky land .....	.5 per cent.
Orchards reported in good cultivation .....	.48 per cent.
Orchards reported in fair cultivation .....	.27 per cent.
Orchards reported in poor cultivation.....	.14 per cent.
Orchards reported in grass .....	.3 per cent.
Orchards reported in vegetables .....	.3 per cent.
Orchards reported in no cultivation .....	.3 per cent.
Orchards reported in grain .....	.2 per cent.

INJURIOUS INSECTS OR FUNGI PESTS FOUND.

Pear Leaf Blister Mite	9
Saw Fly	8
Apple Anthracnose ..	7
Apple Twig Blight	3
Apple Scab	2
Apple Tree Fungi	2
Caterpillar—Tent	2
Currant Leaf Curl	1
Peach Leaf Curl	1
Pear Scab	1

FAVORITE SELECTED—OF APPLES.

Wealthy	70
Duchess	20
Y. Transparent	12
McIntosh	8
Alexander	5
Gano	5
Ben Davis	5
Snow	3
Pewaukee	2
N. Spy	2
D. Red	2
Minnetonka	1
Akin	1

FAVORITE OF PLUMS AND PRUNES.

Yellow Egg	2
Aitkin	1
Bradshaw	1
Lombard	1
Moore Arctic	1
Italian Prune	1

FAVORITE OF CHERRIES SELECTED.

Early Richmond	12
Montmorency Ord....	4
Wragg	3

RECAPITULATION OF ORCHARD INSPECTION IN MONTANA FOR THE YEAR 1901.

Total number of orchards inspected	594
Total number of apple trees inspected	423,982
Total number of plum and prune trees inspected ..	15,610
Total number of pear trees inspected	9,026
Total number of cherry trees inspected.....	12,421
Total number of peach and apricot trees inspected ..	460
Total of all fruit trees inspected	461,499
Total acres of all small fruits inspected.....	112
Cases of Injurious Insects and Fungi Pests found ...	86

They consist of the following: Pear Leaf Blister Mite, 22; Codling Moth, 20; Saw Fly, 8; Apple Anthracnose, 7; Oyster Shell Bark Louse, 6; Strawberry Weevil, 4; Ten Caterpillars, 3; Apple Worm, 2; Apple Twig Blight, 3; Apple Scab, 2; Apple Tree Fungi, 2; Wolly Aphis, 1; Currant Leaf Curl, 1; Peach Leaf Curl, 1; Pear Scab, 1.

Varieties selected as favorites throughout the state are as follows: Wealthy, Alexander, Duchess, Shackelford, McIntosh, Jonathan, Peter, Antonovka, Boiken, Snow, King, Baldwin, Walbridge, Wolf River, N. W. Greening, Yellow Transparent, Maiden Blush, Salome, Gano, D. Red, N. Spy, Black Twig, Ben Davis, Bismarck, Pewaukee, Minnetonka and Akin.—Total 27.

Favorite varieties of Cherries: Bing, Early Richmond, Montmorency and Wragg.

Favorite varieties of Plums and Prunes: Yellow Egg, Aitkin, Bradshaw, Lombard, Moor Arctic and Italian prune.

Meeting of the Board in Missoula.

At the meeting held in Missoula Feb. 20, 1902, there were present Mr. Olney Taylor, Mr. C. H. Campbell, Mr. J. H. Edwards and Mr. C. M. Allen. The matter of duplicating orchard records, fruit statistics and other matters that a fire loss might render irreparable was discussed and it was decided to have the same done. During the year this has been done. Copies of statistics were requested to be furnished all members of the board. The same was done.

Mr. E. N. Brandegee, of Helena, was elected inspector-at-large for the state.

It was agreed that the board should purchase six complete spraying outfits so as to be prepared to carry on the work of eradicating the codling moth. The same were purchased and were used by the board in their work during the past year.

The secretary was instructed to secure from the railroad companies as complete data as possible as to the amount of agricultural products imported into our state that might be produced at home. In accordance with the above instructions this work was begun early in the year 1902 and continued from time to time, as the duties of this office would permit, and was completed last November. The task was one requiring much labor and time, and while the figures as herein compiled and presented may not appear very extensive they will be found to cover the entire importations of agricultural products, covering a period of twelve months, giving the article, amount and the name of the states from which these importations were made. To secure the data the records of thirty-five freight and express stations were examined. This meant a scrutiny of over 700,000 way bills. Copies of this table were furnished to the Hon. J. A. Ferguson, Commissioner of Labor and Agriculture; Mr. Ray, assistant examiner; Governor Joseph K. Toole, Bozeman Agricultural College, each of the five members of the board and also to the press. The tables provide subject

matter for every thinking person of the state. No amount of printed pages can tell the story of what we don't produce with the effect that these figures recite. Lack of time forbids me writing at any length on this subject. It is the purpose, however, of this office to present the matter through the press and in pamphlet form at a later date, when each product will be taken up separately, as it should be, and we will for the present allow the tables to speak for themselves.

AGRICULTURAL PRODUCTS IMPORTED INTO MONTANA, SHOWING ARTICLE, QUANTITY AND STATE IMPORTING, COVERING A PERIOD OF ONE YEAR.

	Onions	Cabbage	Potatoes	Totals
California	316,500	1,538,232	2,739,510	
Oregon	176,958	.....	106,200	
Washington	773,847	16,235	929,472	
Idaho .....	.....	216	5,470,293	
Utah	109,056	29,000	199,320	
Colorado	29,000	.....	.....
Wyoming .....	.....	.....	.....
N. Dakota	240	456	474,072	
S. Dakota .....	.....	.....	.....
Nebraska .....	.....	168	.....
Kansas .....	.....	.....	.....
Minnesota	37,008	60,732	416,160	
Iowa .....	.....	.....	.....
Missouri .....	.....	.....	39,360	
Wisconsin .....	.....	.....	.....
Illinois	33,000	.....	.....
Total	1,475,609	1,645,039	10,374,387	13,495,035

	*Mixed Vegetables	Celery	Asparagus	Totals
California	1,455,516	1,200	.....
Oregon	9,973	.....	66	
Washington	904,150	10,962	14,944	*
Idaho	34,200	.....	60	
Utah	465,032	11,462	4,608	
Colorado	58,512	49,638	.....
Wyoming .....	.....	.....	.....
N. Dakota	19,164	.....	.....
S. Dakota .....	.....	.....	.....
Nebraska	2,256	305	.....
Kansas .....	.....	.....	.....
Minnesota	47,560	1,004	.....
Iowa .....	.....	.....	.....
Missouri	1,342	300	.....
Wisconsin	96	.....	.....
Illinois .....	.....	.....	.....
Total	2,997,801	74,871	19,678	3,092,350

* Not classified on Freight Bills.

	Green Beans	Green Peas	Green Corn	Totals
California				
Oregon	2,736	354	120	
Washington	3,051	9,310	4,230	
Idaho	2,658	942	3,390	
Utah	1,777	857	7,974	
Colorado	864	450	60	
Wyoming				
N. Dakota				
S. Dakota				
Nebraska				
Kansas				
Minnesota	470	1,200		
Iowa				
Missouri	480			
Wisconsin				
Illinois				
Total	12,036	13,113	15,774	40,923

	Tomatoes	Cucumbers	Lettuce	Totals
California	148,038			
Oregon	1,761	10,655		
Washington	31,742	2,025	3,238	
Idaho	7,992	569		
Utah	116,624	8,532		
Colorado	5,066	144		
Wyoming				
N. Dakota				
S. Dakota				
Nebraska			160	
Kansas	60	106		
Minnesota	23,164	16,320		
Iowa				
Missouri	129,153	3,180		
Wisconsin	60			
Illinois		864		
Total	463,660	42,395	3,398	509,448

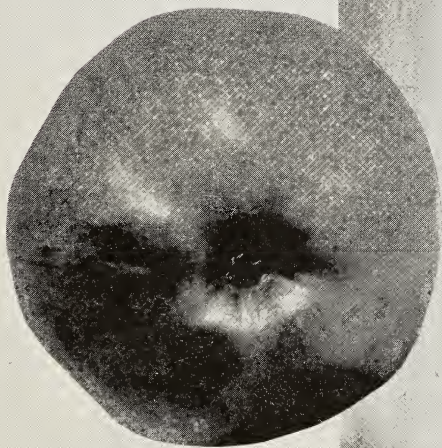
	Spinach	Rhubarb	Squash	Totals
California				
Oregon				
Washington	5,799	40,435	2,236	
Idaho				
Utah	50	1,386	2,490	
Colorado				
Wyoming				
N. Dakota				
S. Dakota				
Nebraska				
Kansas		264		
Minnesota				
Iowa				
Missouri				
Wisconsin				
Illinois				
Total	5,849	42,085	4,726	52,660

	Carrots	Beets	Horse Radish	Totals
California	1,800	1,800	.....
Oregon .....	.....	.....	4,050	
Washington	2,832	870	200	
Idaho	83	.....	.....
Utah .....	.....	.....	.....
Colorado .....	.....	.....	.....
Wyoming .....	.....	.....	.....
N. Dakota .....	.....	.....	.....
S. Dakota .....	.....	.....	.....
Nebraska .....	.....	.....	60	
Kansas .....	.....	.....	.....
Minnesota .....	.....	.....	120	
Iowa .....	.....	.....	.....
Missouri .....	.....	.....	.....
Wisconsin .....	.....	.....	.....
Illinois .....	.....	.....	.....
Total	4,715	2,670	4,430	11,815

	Turnips	Dried Peas	Dr'd Beans	Totals
California	12,000	.....	654,464	
Oregon	
Washington	1,276	14,664	76,548	
Idaho	
Utah	
Colorado	
Wyoming	
N. Dakota	
S. Dakota	
Nebraska	948	
Kansas	
Minnesota	8,544	144,114	
Iowa	
Missouri	
Wisconsin	
Illinois	816	313,580	
Total	13,276	24,024	1,189,654	1,226,954

	Clover Seed	Flax Seed	Millet	Totals
California .....	.....	.....	.....
Oregon .....	.....	.....	.....
Washington .....	.....	.....	.....
Idaho .....	.....	.....	.....
Utah	39,000	.....	.....
Colorado .....	.....	.....	.....
Wyoming .....	.....	.....	.....
N. Dakota .....	.....	.....	.....
S. Dakota .....	.....	.....	.....
Nebraska .....	.....	.....	.....
Kansas .....	.....	.....	.....
Minnesota	27,336	6,060	25,010	
Iowa .....	.....	.....	.....
Missouri	14,424	.....	.....
Wisconsin .....	.....	.....	.....
Illinois	24,354	.....	.....
Total	105,114	6,060	25,010	136,184

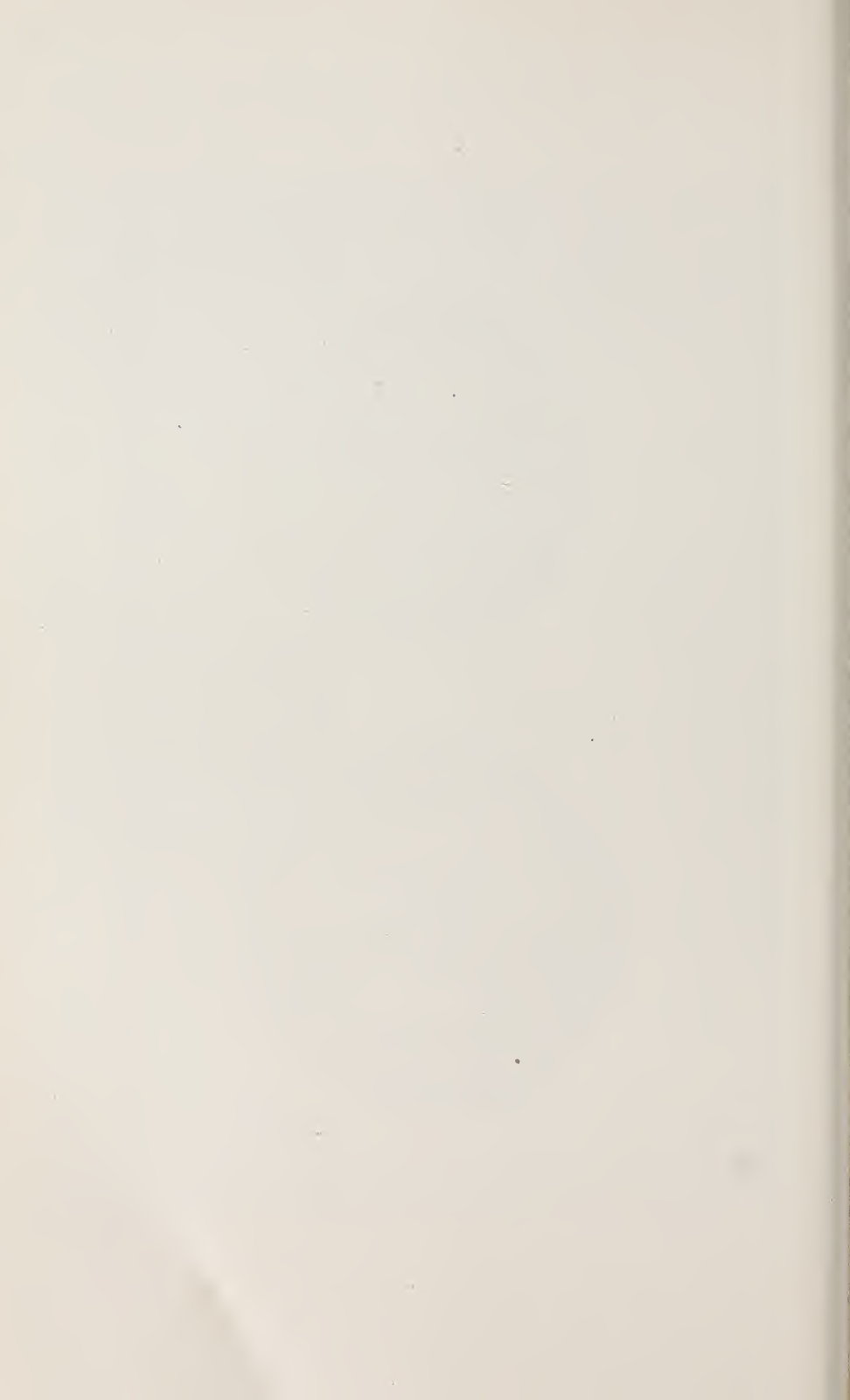
	Alfalfa Seed	Barley	Oats	Totals
California				
Oregon				
Washington		145,200	49,080	
Idaho			82,560	
Utah	54,446			
Colorado				
Wyoming				
N. Dakota			153,600	
S. Dakota				
Nebraska				
Kansas				
Minnesota			47,100	
Iowa				
Missouri	29,000			
Wisconsin				
Illinois				
Total	83,446	145,200	332,340	560,986
	Wheat	Malt	Mixed Pickles	Totals
California		265,332	380,538	
Oregon			288	
Washington	4,471,134	897,768	45,306	
Idaho	267,432			
Utah			92,760	
Colorado			36,660	
Wyoming				
N. Dakota	13,332,584			
S. Dakota				
Nebraska		60,000	1,206	
Kansas				
Minnesota	168,000	46,440	425,196	
Iowa				
Missouri			313,824	
Wisconsin				
Illinois			134,100	
Total	18,239,150	1,269,540	1,429,878	20,938,568
	Ham	Bacon	Cured Meats	Totals
California				
Oregon				
Washington			19,188	
Idaho				
Utah				
Colorado				
Wyoming			1,536	
N. Dakota			2,945	
S. Dakota				
Nebraska	4,384,694	2,198,352	23,186	
Kansas				
Minnesota	243,979	121,350	123,526	
Iowa	258,624	129,554		
Missouri	2,318,584	1,159,281	143,926	
Wisconsin			150	
Illinois	16,140	8,640	238,010	
Total	7,222,021	3,617,177	552,467	11,391,665

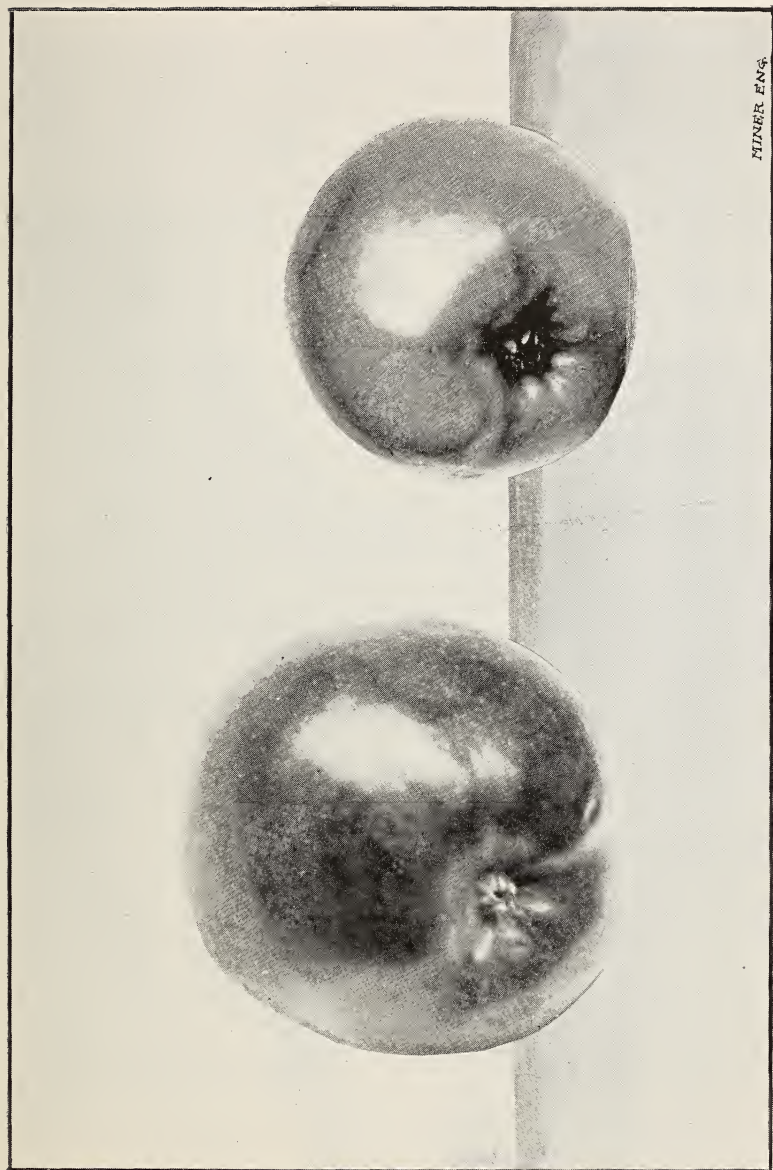


MINER ENG.

ALEXANDER. Large showy apple, well tested throughout state and
classed among most profitable varieties.

NORTHERN SPY. Good quality, color poor, late bearer.
Good keeper.

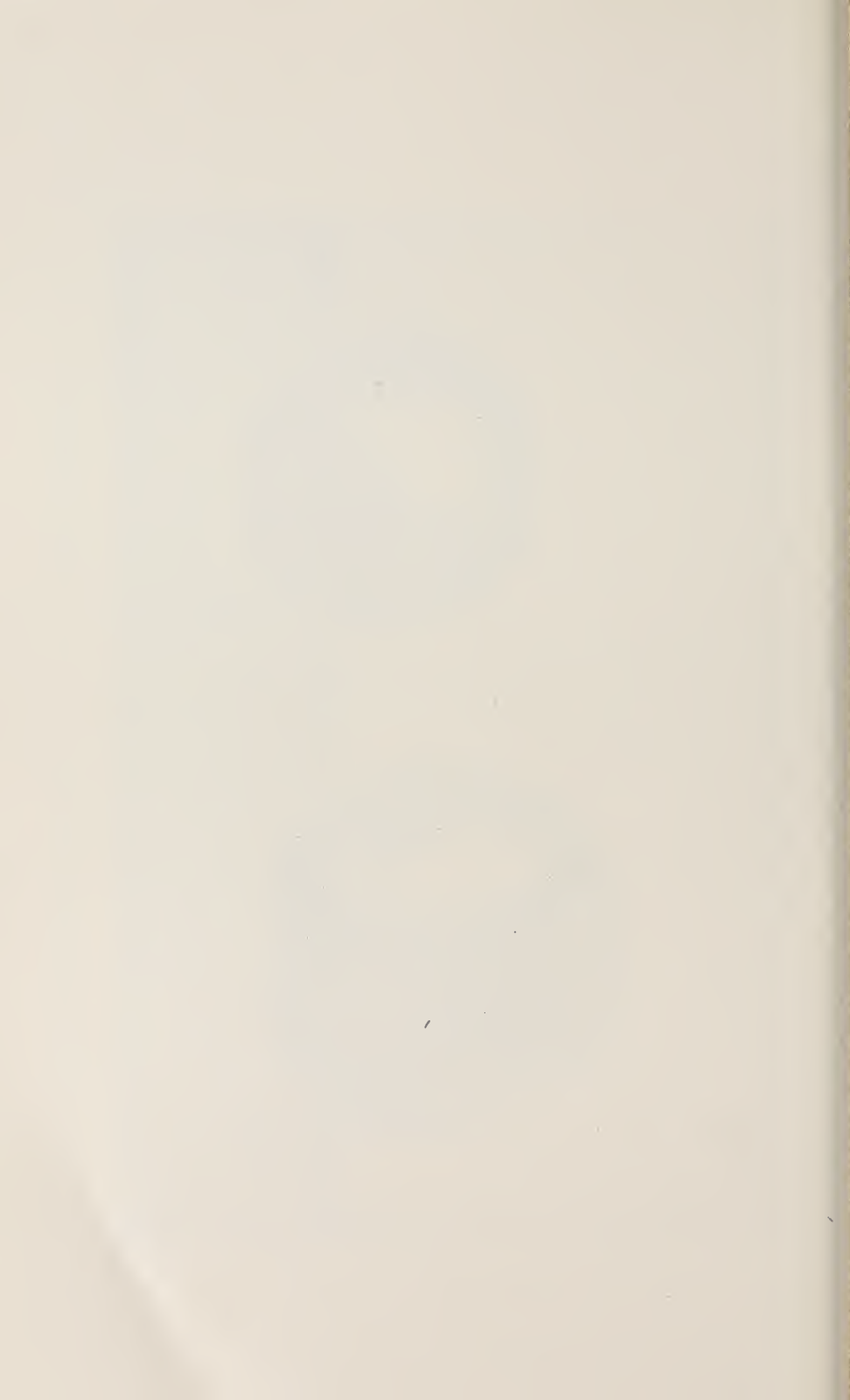




KING. Large handsome apple, good flavor, late variety.

BORKEN. March to June.

HINER ENG.



	Fresh Pork	*Fresh Meats	Condensed Milk	Totals
California .....	.....	.....	.....	.....
Oregon .....	.....	.....	.....	.....
Washington .....	.....	.....	3,900	.....
Idaho	2,317,212	37,191	.....	.....
Utah	164,488	37,778	.....	.....
Colorado .....	.....	390	.....	.....
Wyoming	16,576	1,700	.....	.....
N. Dakota	5,944	54,468	.....	.....
S. Dakota .....	.....	.....	.....	.....
Nebraska	56,213	1,923,970	1,880	.....
Kansas .....	.....	.....	38,160	.....
Minnesota	35,694	503,311	74,958	.....
Iowa .....	.....	77,600	.....	.....
Missouri .....	.....	503,013	328,458	.....
Wisconsin	1,450	.....	.....	.....
Illinois .....	.....	.....	452,629	.....
Total	2,597,577	3,139,421	899,985	6,636,983

* Fresh Meats—Other than Pork.

	Butter	Oleomargarine and Butterine	Cheese	Totals
California .....	.....	.....	.....	.....
Oregon	1,194	.....	168	.....
Washington	3,120	.....	190	.....
Idaho	35,038	.....	1,974	.....
Utah	164,221	.....	121,337	.....
Colorado .....	.....	.....	.....	.....
Wyoming	660	.....	.....	.....
N. Dakota	274,398	.....	3,960	.....
S. Dakota	2,640	.....	.....	.....
Nebraska	1,444,795	93,563	35,419	.....
Kansas	1,215,500	16,302	.....	.....
Minnesota	625,123	17,007	305,221	.....
Iowa	81,462	25,159	.....	.....
Missouri	172,201	513,297	2,760	.....
Wisconsin	205,804	.....	132,624	.....
Illinois	124,800	34,737	147,713	.....
Total	4,350,956	700,065	751,366	5,802,387

	*Eggs	Poultry	Lard	Totals
California .....	.....	.....	.....	.....
Oregon	30,740	356	.....	.....
Washington	1,500	1,554	.....	.....
Idaho	219,100	23,638	.....	.....
Utah	275,280	37,404	.....	.....
Colorado .....	.....	14,304	.....	.....
Wyoming	2,750	600	.....	.....
N. Dakota	73,872	4,820	816	.....
S. Dakota	9,120	.....	.....	.....
Nebraska	2,741,300	1,402,648	1,132,836	.....
Kansas	1,735,920	792,237	.....	.....
Minnesota	496,200	57,364	121,437	.....
Iowa	344,340	.....	60,438	.....
Missouri	774,300	689,044	568,651	.....
Wisconsin	54,360	.....	.....	.....
Illinois	1,800	768	4,442	.....
Total	6,760,582	3,024,837	1,888,620	11,674,039
Grand Total .....	.....	.....	.....	75,569,997

* Eggs—In pounds (4,056,360 dozen).

Value of total importations about \$6,500,000.00.

Meeting of the Board in Helena.

At the meeting held in Helena Dec. 29, 1902, the report of the committee on legislation was presented and the same was adopted and is as follows :

To the Honorable State Board of Horticulture:

Gentlemen: Your committee appointed at the last meeting of the board held in Missoula to revise and amend the horticultural law, rules and regulations, beg leave to submit the following report:

On the second day of December, 1902, your committee met in the city of Missoula. There were present Mr. C. M. Allen, C. H. Edwards and by request Mr. W. B. Harlan and Mr. E. M. Tucker were also present.

After a thorough discussion of the present law and of the needs of the fruit industry of our state, the following amendments were agreed upon:

Section 1 of the original law be amended to read as follows:

Sec. 1. There is hereby created a State Board of Horticulture, to consist of seven members, six of whom shall be appointed by the governor, one from each of the horticultural districts that are hereby created, and the State Executive, who shall be an ex-officio member of the board. No person shall, however, be appointed on said board, or employed by them, who shall be connected in any way with any nursery, or who shall be engaged in the sale or handling for profit of any nursery product.

Section 2 of the original law to be amended as follows:

Sec. 2. The state shall be divided into the following horticultural districts: The first district shall comprise the counties of Dawson, Custer, Yellowstone, Sweet Grass, Carbon, Park and Rosebud; the second district shall comprise the counties of Gallatin, Madison, Jefferson, Beaverhead, Silver Bow, Lewis and Clarke, Meagher and Broadwater; the third district shall comprise the counties of Cascade, Fergus, Valley, Choteau and Teton; the fourth district shall comprise the counties of Missoula, Granite, Powell and Deer Lodge; the fifth district shall comprise the county of Ravalli; the sixth district shall comprise the county of Flathead.

Section 7 of the amended law to be amended as follows:

Sec. 7. For the purpose of preventing the spread of contagious diseases among fruit and fruit trees, and for the prevention, treatment, cure and extirpation of fruit pests and diseases of fruit and fruit trees, and for the disinfection of grafts, scions and orchard

debris, empty fruit boxes or packages, and other suspected material or transportable articles dangerous to orchards, fruit and fruit trees, said board may prescribe regulations for the inspection, disinfection or destruction thereof, which regulations shall be circulated in printed form by the board among the fruit growers and fruit dealers of the state, and shall be published at least ten days in two horticultural papers of general circulation in the state, and shall be posted in three conspicuous places in each county in the state, one of which shall be at the county court house thereof.

For the further prevention of the spread of diseases dangerous to fruit and fruit trees, it shall be unlawful for any person or persons, dealer or dealers, to allow or cause to be used the second time any crate, box, barrel, package or wrapping once having contained fruit or nursery stock, and that the destruction of the same must be made in its entirety and that the finding of such crate, box, barrel, package or wrapping in possession of any person or persons, dealer or dealers, other than the consignee shall be considered prima facie evidence of a violation of this act.

Any member of the board or officer thereof is hereby authorized to seize and destroy by burning without breaking said crate, box, barrel, package or wrapping wherever found and to prosecute said violator or violators.

That section 8 of the amended law be amended to read as follows:

Sec. 8. The said board shall elect from their own number or appoint from without their number, to hold office at the pleasure of the board, one competent person in each district, to be known and act as inspector of fruit pests. Said inspectors shall be selected with reference to their study and practical experience in horticulture. It shall be the duty of said inspectors to visit the nurseries, orchards, stores, packing houses, ware houses and other places where horticultural products and fruits are kept and handled within their respective districts, and to see that the regulations of the State Board of Horticulture to prevent the spread of fruit pests and diseases of trees and plants and the disinfection of fruits, trees, plants, grafts, scions, orchard debris and empty fruit boxes and other material shall be fully carried out and complied with. Said inspectors shall have free access at all times to all premises where any trees, plants, fruits or horticultural products or supplies are kept or handled, and shall have full power to enforce the rules and regulations of the State Horticultural Board, and to order the destruction and disinfection of any or all

trees, plants, fruits or horticultural products or supplies found to be infected with any disease as prescribed or designated by said board.

The said board may appoint one or more, as necessary, competent persons to be known as special inspectors, whose general powers and duties shall be regulated and prescribed by the member of the board for that district. Such special inspector shall receive such sum per day as the said Board of Horticulture may agree upon, provided, such sum shall in no case exceed the sum of five dollars per day for the time actually employed.

The said board shall appoint one person to be known as inspector at large for the state, whose duties shall be prescribed by the board, and who shall receive the sum of five dollars per day for time actually employed.

That section 9 of the amended law be amended so as to read as follows:

Sec. 9. It shall be the duty of every person or persons, corporation or corporations, who shall sell or deliver to any person or persons, corporation or corporations, any trees, plants, vines, scions or grafts, to notify the secretary of the board, whose duty it shall be to notify the inspector of said district wherein such trees, plants, vines, etc., etc., are to be delivered at least five days before said goods are to be delivered, giving the date and nursery or railroad station where said trees, plants, scions, etc., etc., are to be delivered, together with the name of the party or parties who are to receive the same. It shall be the duty of the inspector receiving said notice to inspect the said trees, plants, grafts, scions, etc., etc., as soon thereafter as practicable, and if the same be found free from any and all diseases or pests, as designated by said State Board of Horticulture, he shall so certify and shall attach such certificate to each lot or bill of such trees, grafts, plants, scions, etc., which said certificate must contain a list of the said trees, grafts, scions, vines or plants so inspected. But if any of the trees, grafts, scions, vines or plants so inspected shall be found to be diseased or infested with any of the pests as prescribed by said board, then the inspector shall order the disinfection or destruction of such trees, grafts, scions, vines, etc., etc., so diseased or infected, together with all boxes, wrapping or packing pertaining thereto, and charge and collect the sum of ten dollars (\$10) for the disinfection and inspection of each carload of said nursery stock and a proportionate sum for less than car lots, but in no instance less than two dollars (\$2) for each separate inspection or

disinfection, provided, that the State Board of Horticulture shall have power to designate certain places as quarantined stations, where all nursery stock brought into the state shall be inspected and disinfected. For the inspection of fruits a fee of two cents per box or package, with a maximum fee of five dollars for each separate lot or car shall be charged and collected. The inspectors shall collect such fees and shall not give certificates of inspection until the fees are paid.

Amend section 15 of the general law so as to read as follows:

Sec. 15. The inspectors of fruit pests appointed or elected by said board shall receive as compensation for their services such sum as the board may regulate, provided, not to exceed five dollars per day for the time actually employed. The members of said board shall receive no compensation for their services except actual expenses paid out. The secretary of said board shall receive the sum of \$1,000 per annum for his services.

Amend section 19 of the amended law so as to read as follows:

Sec. 19. There is hereby appropriated for the use of the State Board of Horticulture, as set forth in this act, out of the moneys in the state treasury, not otherwise appropriated, the sum of ten thousand dollars (\$10,000), or as much thereof as may be necessary for the year commencing March 1, 1903, five thousand dollars (\$5,000) or as much thereof as may be necessary for the year commencing March 1, 1904.

The following blank sections to be created:

Sec. —. Every person who for himself, or as agent for any other person or persons, transportation company or common carrier, shall deliver or turn over to any person or persons, corporation or corporations, any fruits without first having attached the inspector's certificate, shall be deemed guilty of a misdemeanor.

Sec. —. No person, firm or corporation shall engage or continue in the business of selling within the state, or importing fruit trees, plants or nursery stock into the state without first having obtained a license to do business in this state, as in this act provided.

Sec. —. Any person, firm or corporation may obtain a license to engage in the business of selling fruit trees, plants or nursery stock into this state upon the payment of the sum of twenty-five dollars and by filing with the secretary of the State Board of Horticulture, bond, with sureties, in the sum of one thousand dollars (\$1,000), conditioned that the principals will faithfully obey the laws of the State of Montana, and that the said principals will pay.

the cost of fumigation of all nursery stock or other materials or goods imported into or sold within the state by the said principal or his or their agent, and the expense of destruction of any infested nursery stock. License granted under this act shall be for one year or less, at the discretion of the board.

Sec. — It shall be the duty of every person, firm or corporation licensed to do business under this act to notify the secretary of the State Board of Horticulture of his intention to ship an invoice of fruit trees, plants or nursery stock from one point to another in this state, or from any point without this state into this state. The said notice shall contain the name and the address of both the consignor and consignee, and the invoice of the goods to be shipped, the freight or express office at which the goods are to be delivered and the name or title of the transportation company from whom the consignee is to receive such goods. Such notice shall be mailed at least five days before the day of such shipment.

Sec. — It shall be the duty of each person or corporation offering to sell, or selling and delivering, any nursery stock, fruit trees, plants, vines, scions, cuttings, etc., etc., within the State of Montana, to place on each and every package so sold and delivered a label or card containing the name and address of both the consignor and consignee and the invoice of the stock therein contained.

Sec. — Any person or persons who shall receive and accept any nursery stock, fruit trees, plants, vines, scions, cuttings, grafts, etc., etc., that have not been inspected by a duly appointed inspector of the State Board of Horticulture and shall use or dispose of said nursery stock, fruit trees, vines, plants, scions, cuttings, grafts, etc., etc., without first notifying the inspector and furnishing him opportunity to examine and if necessary fumigate the said nursery stock, will be deemed guilty of a misdemeanor and will be subject to fine as further provided in this act.

Sec. — All nursery stock, trees, plants, vines and cuttings, grown or growing within the State of Montana, used for filling orders, shall, after said stock shall have been taken from the nursery rows or grounds, and before the same shall have been packed for delivery, be inspected by a duly appointed inspector and shall be disinfected by fumigating or other method, when in his judgment such is necessary. After such inspection, if it be found that said nursery stock, trees, plants, vines and cuttings are clean and free from insects and fungi pests, he shall issue his certificate to

said nurseryman and said certificate shall entitle him to use said stock, so inspected and disinfected for filling orders for the next current delivery.

Nurseries shall give to the secretary of the board five days notice of the time when said stock shall be ready for inspection under the provisions of this act.

Sec. —. Any person or persons, corporation or corporations, transportation companies or common carriers, violating any of the provisions of this act shall be deemed guilty of a misdemeanor and fined in the sum of not less than twenty-five dollars (\$25), nor more than three hundred dollars (\$300).

It will be noticed that we have recommended that the appropriation be increased to the sum of \$5,000, or as much thereof as may be necessary for each year and \$5,000 extra for the purpose of carrying on the work of exterminating the moth. This was done after careful estimates were made of the money necessary to carry on the work and to give the fruit industry of our state the protection it must have if we are to preserve the present clean condition of our orchards.

We would recommend that stringent inspection be kept up in Butte, Anaconda, Helena, Missoula, Great Falls, Kalispell, Billings, Miles City, Bozeman, Plains, Thompson, Dillon, Glasgow, Chniook and all points possible, and that wherever possible the inspectors be placed on salary to be fixed by the board.

We would recommend that the inspector at Butte continue to look after Anaconda, as has been done by him in the past; that the office of fruit inspector for the district in which Missoula is situated be combined with that of orchard inspector and thus enable the board to pay a sufficient salary to secure the constant attention of that officer to the boards' work; that the offices of fruit inspector and orchard inspector at Great Falls be combined for a like purpose; Billings to be also combined for like reasons; Helena, Miles City, Bozeman, Plains, Kalispell and Thompson inspectors to be placed on salary to be fixed by the board. Our reasons for these changes are that under existing conditions the amount possible for an inspector to earn at these points under the fee system is inadequate compensation to secure reliable service.

C. M. ALLEN, Member Fourth District.

C. H. EDWARDS, Secretary.

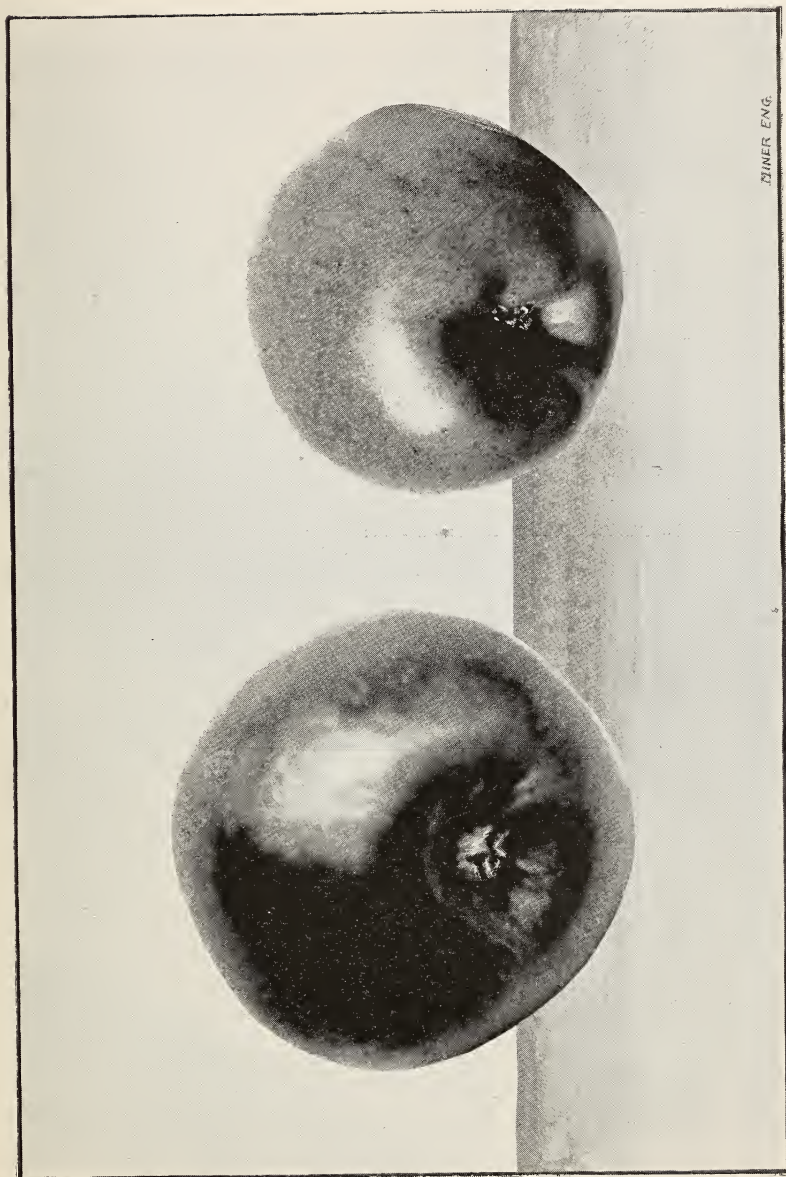
The reports of the secretary, inspectors and members of the board were read and adopted. The secretary was instructed to correspond with like boards with a view to securing the passage of a law requiring the fumigation of fruit cars having once been loaded with apples or pears before allowing the same to enter another fruit district.

It was resolved by the board to try during 1903 Mr. C. M. Allen's plan for the eradication of the moth, provided the appropriation requested was secured.

The inspector-at-large was authorized to call meetings of inspectors as often as deemed necessary, provided that said meetings be not called more than twice a year and that inspectors be allowed actual expenses while in attendance.

The chief diseases affecting fruits and coming into our state, or liable to dissemination among our fruits are the San Jose scale and the codling moth. During the early part of the shipping season of 1901 nearly all fruits coming into the state were more or less affected and it required constant watching to keep them in check. The inspectors, however, with the experience of the past, were well posted and through a combined effort which has characterized the employes and the members of the board a system of inspection has been brought about that has secured to the dealers and the consumers absolutely clean fruit, something unknown in the markets of the state heretofore, for it has always been a well-known fact that Montana was the dumping grounds for diseased fruits for the northwest. The dealers to a man are heartily in favor of the law and they are loud in their praise of the satisfactory manner that the law has been enforced. There has been distributed from this office during the two years over four thousand pamphlets, circulars and books. The greater portion of them have been sent out by express to the various inspectors and members and by them distributed to those who cared to receive them. This method was taken to save postage. Information on crops, condition and quantity, on pests and what to do for them, on our state and what it offers to the intending settler, and upon many other subjects has been furnished through letter to inquirers.

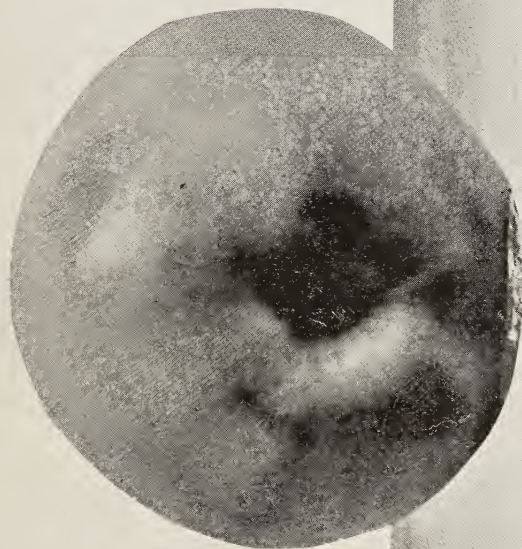
The board has gathered together a very good library of about 300 bound volumes and unbound and some 2,000 bulletins which covers the field of horticulture and agriculture. The part treating on the diseases and remedies and propagation of fruits has been filed under separate heads, each subject filed and forms a very complete and useful library.



ZINER ENG.

HUBBARDSTON. Good size, color yellow with red stripes, quality good, season late, not thoroughly tested here.

SHACKLEFORD. January to March.



McMAHON. Large, color white, light bearer, tree hardy,
fair flavor, December and January.



NEWTON PIPPIN. Small, not popular.

TINER ENG.

It has been the earnest effort of this office to glean all the information possible on the question of fruits and their diseases and to that end everything in the way of circulars and books that contained matters of interest to the inspectors in their work has been possible to get I have secured and sent to them. Two of the most valuable works that it has been our good fortune to receive in this office are the Year Book and the report of the Oregon State Board of Horticulture. These books, with a treatise on the uses of hydrocyanic gas in fumigating were sent from this office to all members and inspectors.

During the summer many diseased fruits were sent to the inspectors and members and they have been of great benefit to all in the work. In this way frequently inspectors have been educated to know at a glance some of the worst known pests and have not had to remain in doubt as to the proper course to pursue.

Attention is called to the tables which are submitted and made a part of this report. They cover the question of fruit inspection, orchard inspection, receipts and disbursements of the fee fund, and importations of agricultural products. They show the totals of all the various fruits received into the state and inspected and from where they came, and the agricultural products imported into our state. They are facts and they speak of the work done by the board better than any number of pages of manuscript can. Much time has been necessary to complete them and they are submitted with the hope that they may be of service to the state and to the board in their future work.

CHARLES H. EDWARDS, Secretary.

Inspectors' and Members' Reports.

Mr. C. H. EDWARDS,

Secretary State Board of Horticulture,
Butte, Montana.

Dear Sir: The following is a brief report of my work as inspector in First district:

As it became impossible for me to attend to the inspection of fruit in Billings I was fortunate in securing the services of Mr. I. D. O'Donnell at that place.

I have not been able to inspect all the orchards in this district, as to do so would require in some cases a whole day to reach a very small number of trees and this expense I did not think it advisable to incur.

I have inspected 37 orchards containing about 17,000 fruit trees of the different varieties. The orchards of this district are in a generally thriving condition where they have been properly cared for, but many of the trees are suffering from neglect, their owners apparently thinking after planting them there is nothing more to be done for them to secure a fine crop of fruit.

It is probable that many varieties have been planted that are not hardy enough to withstand our coldest winters and will have to be replaced with other trees. Many people do not know what varieties they have planted and when the tender ones shall have died are liable to plant the same kind again.

I feel that it cannot be urged too strongly upon orchardists to plant only those varieties that are known to be hardy. Another mistake is being made in planting too great a number of varieties, as in so doing they will not have enough of any one kind to make a shipment.

The Codling Moth has made its appearance in some of the older orchards and it is becoming evident that to prevent or at least to reduce its ravages we must resort to spraying as practiced in the older states.

The Woolly Aphis has been found in one nursery, the trees from which will have to be fumigated before they are removed from the nursery grounds. I should estimate the total number of fruit trees growing in this district at about 60,000, a large part of which have not yet come into bearing.

Very respectfully,

Park City.

OLNEY TAYLOR,
Inspector First District.

Helena, Mont., December 18th, 1902.

Fruit shipped to Helena has been clean this year. Shippers have learned, and some of them by bitter experiences, that no other class of fruit can come with safety to this market. Importers have been careful in ordering, and localities and shippers that fail to send fruit free from pests, receive no further orders from Helena.

Oranges and lemons have often on them four species of scale insects, the Red Scale, *Aspidiotus aurantii*, the Yellow Scale, *Aspidiotus citrinus*, the Purple scale, *Mytilaspis citricola* and the

Oleander scale, *Aspidiotus hederae*. All these scales are distinctly citrus fruit pests or sub-tropical, and are not a menace to local orchards. They do not injure the fruit. The work of the rust mite is more and more in evidence each year, indicating the spread of this pest in citrus groves. Navel oranges have a disgusting black fungus in them, also becoming more common, and it is probably a *Macrosporium*.

Apples from Santa Cruz Mountains, Cal., have had on them the Greedy Scale, *Aspidiotus rapax*. Belleflower apples from Watsonville, Cal., had in them this year colonies of *Aphis* around the seed. The species is not determined. Apple scab was abundant last year and pear scab less so. Pear blight also came on quinces and pears from California. There is no probability of infection of our orchards from these fungi on fruits.

Monilia fructigena, a parasitic rot, was common year before last on plums and cherries from the coast. The brown spot of the apple is often seen. Apples from the highlands of Idaho sometimes rot and turn black with a parasitic fungus, a species of *Stemphyllium*. *Penicillium* sp. is very destructive to even green lemons in transit from California.

The past season brought San Jose Scale from Walla Walla in small quantities only, and shipments from that quarter promptly ceased.

Codling Moth is the most difficult pest for the inspector to deal with, as it is the gravest in the apple industry. I have seen little of it this year, less than any previous year. While one is pretty sure that a car load of apples from a district infested with the moth must contain some apples with worms, yet so careful has been sorting and packing this year, that I could find no worms in nearly every car that came to Helena.

Peaches, year before last were disgusting from the presence of *Anarsia lineatella*, the Peach Twig Borer, a serious enemy of the peach. It would become a pest here if peach trees were grown in numbers. Powdery Mildew is extremely common on peaches from Utah. I have seen it on a few pears from the same state.

Peaches have frequently on them a fungus which occurs in round blotches about the size of the San Jose Scale. The fungus is probably a *Helminthosporium*. Apricots are red spotted by a fungus which superficially resembles closely San Jose Scale. It perforates the leaves of apricot cher-

ry and plum and is a Shothole Fungus, *Phyllosticta circumscissa*.

E. N. BRANDEGEE,
Resident Fruit Inspector, Helena.

Great Falls, Mont., October 31, 1902.

To the Honorable State Board of Horticulture:

Sirs:—I have in the last three months driven over the greater portion of Cascade County and have seen nearly all of the fruit trees in the Third District, as there are very few outside of the County in this District.

I have inspected twenty orchards, which contained 2,368 fruit trees and 15,319 currant, gooseberry, raspberry and blackberry bushes and 1 3-4 acres of strawberry plants, and am glad to say have not found a single pest of dangerous character on any fruit tree or on any of the small fruits. Most of the orchards are small and rather young, but few trees old enough to bear.

Although we have no pests here I believe as yet, we have serious things to contend with; first is to get the people to take an interest in the raising of fruit, and get them to take care of the trees after they are set out. In many cases I have found a small orchard set out and left to take care of itself, and how can we expect to get good results from such care as this. After the trees nearly all or all die, this same man says you can not raise fruit in this country, while if the trees had been taken care of properly they would have done well.

In many instances they set their trees in an unsheltered place, where the wind continuously blows, when they might just as well set them in a well sheltered place in good soil.

I have always tried to induce the people to select a good location and take an interest in their trees with the idea of a money proposition.

I saw one small apple orchard on Otter Creek about the first of August, where the apples were only about half grown, but the trees were loaded so heavy that the limbs were breaking down, the apples hanging in clusters almost like grapes, and this orchard had very little care. Another orchard on the Missouri near Hardy, Montana, was the same way, and this is a common occurrence where there may be only four or five apple trees. This simply shows what can be done here, and with firstclass care, these trees would produce an enor-

mous crop. There is one well cultivated and irrigated orchard on Belt Creek, although the apple and plum trees are too young to bear; this man had a large crop of currants, gooseberries and strawberries. These small fruits can be raised with good success in most any part of this County.

With careful selection of a well sheltered place in good soil, which can be irrigated, and with good cultivation we can raise several varieties of hardy applies, I think as nice as can be raised in most any part of the State.

We had a good display of apples at the Cascade County Fair, which was held here from September 16th to 20th, and I think in this way we can advertise to a good advantage the fruit facilities of this country, and would recommend that a special effort be made to give a good premium for fruit displays at the different fairs held throughout the State, and in this way induce the people to take an interest in, and bring in their fruit. It seems to me that a very small per cent of the citizens here understand how much fruit culture means to the State; if properly handled it certainly is bound to become a large and profitable business.

From May 3rd, 1901, to October 31, 1902, I inspected and fumigated two car loads and 51 shipments which contained 80 separate boxes or bales of nursery stock, and collected for inspection and turned into the State for this \$137.

I also inspected 20 orchards which took me fourteen days. I have put in 55 days in special inspection duty during this time which amounts to \$275, less the \$137 collected as fees, leaves the total cost at this point, outside of supplies, \$138 for the eighteen months. There will be a few more trees shipped in this fall, but the inspection fees will nearly pay for time employed in same.

The fruit here has been coming very nice and clean this year and we have had very few moths here this fall. We had a small amount of Red Scale here on lemons in the spring, but did not condemn, as we think there is nothing in this country that could be affected by this. When I first came here I condemned and burned 198 boxes of apples and pears that were badly infected with the Codling Moth; also 224 boxes of peaches that were badly eaten by the peach worm. This year I have condemned and burned 201 boxes of apples infected with the Codling Moth.

I have had considerable correspondence with the California shippers cautioning them against sending infected fruit and think they thoroughly understand that it takes good fruit to pass the market

here; however think that any responsible shipper appreciates the law, both for his own good and for that of the consumer.

Last spring we had quite an amount of *Schizoneura Americana* on the elm trees here, along the boulevards and in the parks, which hurt the looks of the trees a good deal. I think if they were sprayed that we might be able to check the spread of this pest. Some of the elm trees were also infected with a green worm, which ate the leaves badly.

There was one case here very similar to the Crown Gall, but as it was not reported to me until after the three trees were burned, I do not know what it was. I have made a careful examination since and can find no trace of gall on the surrounding trees.

Very respectfully,

C. E. HUBBARD,
Inspector Third District.

To the Honorable State Board of Horticulture:

Gentlemen: As inspector in the Fourth district, I am called upon to act in the capacity of both fruit and orchard inspector. As fruit inspector I have inspected 11,288 packages of fruits and have found the same to be free from insects and fungi pests.

Peaches from Walla Walla, Prosser and North Yakima were very good. Early pears from Washington and Idaho were badly infected; later shipments of these fruits were found to be quite clean. Plums, prunes and apricots were good. Cherries came mostly from Washington and Idaho and were very good. I would call the attention of the orchardists that I have found the large sweet cherry a success wherever properly cared for in this locality. Taken as a whole the fruits received from other states in Missoula were found to be comparatively free from all diseases.

Orchard Work. .

Early in the spring all of the old fruit trees in and around Missoula were thoroughly pruned and the old bark scraped from off them, preparatory to being sprayed for the Codling Moth. Care was taken to burn up all the old debris, so that none of the moth in hiding might escape. After the blossoms had fallen from the apple and pear trees they were thoroughly sprayed with Paris green. This spray was applied between the 2d and 9th of June. Later, between the 10th and 25th of August the results from this work will be found to appear in the report of the inspector at large and the same trees were again sprayed. The results of both sprays

were quite gratifying. The number of trees sprayed was 4,374; number of homes at which spraying was done, 335. Six large 50 gallon barrel sprayers were used, each requiring two men, one to pump and one to direct the spray. Considerable difficulty during the first operation to get the machines through the common gate so as to reach the trees, but later each machine was provided with a long hose so that the trees in small gardens could be reached without moving the machines from the streets. Where trees were inaccessible to the barrel sprayer, a small bucket sprayer was pressed into service. All the spraying machines were provided with the "Vermorel" nozzle.

During the progress of the spray two men were engaged in placing bands on the older and more infested trees. The total number of trees banded during the season was 492. Some trees required only two bands, while others required as many as 20. Bands were placed around the trunk of the trees near the ground and around each important limb near the main body of the tree. The material used was burlap from six to eight inches in width, tied with heavy twine. A total of 1,094 bands were placed and thoroughly examined during the entire season. Thousands of larvae of the Codling Moth were in this way found and destroyed.

Missoula is the key to the greatest fruit producing section in the state. There are no orchards for many miles in any direction from the city and it may be possible, with extreme care, to entirely eradicate the moth from this now infested section.

The state is much indebted to Mr. C. M. Allen, of the board, for the deep interest displayed by him in the work.

E. M. TUCKER,
Inspector Fourth District.

Missoula, Montana.

To the Montana State Board of Horticulture :

Gentlemen: As deputy inspector of the Fifth district, I have inspected 28,098 packages of fruits and out of this number found it necessary to condemn 144 packages. I have also inspected and fumigated all the nursery stock which has arrived at this point for the past two years.

O. A. PARSONS,
Deputy Inspector Fifth District.

Kalispell, Mont.

President and Members of the Board of Horticulture:

I have the honor to hand you my first annual report. I was appointed as orchard inspector for the Fifth Horticultural district of Montana in April, 1901, and began inspecting orchards in May following. I traveled over six hundred miles inspecting.

Owing to the large extent of territory and number of orchards, the inspection must be superficial to an extent in the time allowed. Had I the benefit of a year's experience, or the notes of my predecessor, could have given a more thorough inspection. Knowing now where the orchards are I could in the future work to better advantage.

I inspected during the season 350 orchards, containing 108,046 trees.

I found no Codling Moth or larvae. In three separate orchards I found single specimens of windfall apples with a worm hole and think the holes were made after the apples had fallen to the ground.

I found pear leaf blister quite prevalent. I successfully treated two orchards by removing all foliage, by cutting back close, burning refuse and washing trees thoroughly with whale oil soap and quassia chips. Trees treated in June. They threw out new foliage and remained vigorous the balance of the season. I find the pear leaf blister mite very destructive. Apple aphid not as numerous as common, the past season, on account of hot and dry summer. I recommend whale oil soap and quassia chips. I would prefer kerosene emulsion, but very few persons make a perfect mechanical mixture, so did not recommend it.

Plum aphid very plentiful; cherry aphid scarce. In a few neglected orchards found apple trees killed by aphid, others nearly dead. In four orchards found apple scab. In one orchard which had been planted fourteen years, scab had not spread from the single tree affected. I recommended spraying with bordeaux mixture.

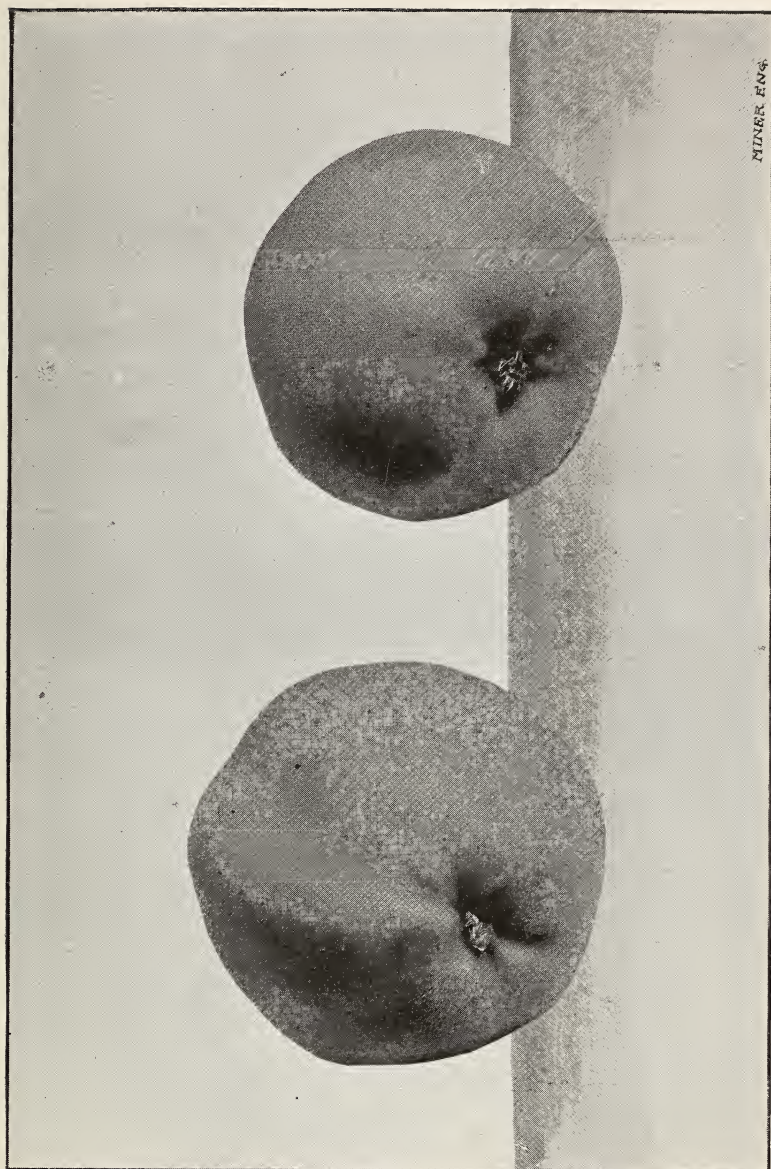
I found in five orchards a mite on the under side of the raspberry leaves which cause the death of the cane. The insect, which resembles a yellow spider, is very small, but is visible to the unaided eye, suspended with the egg (a minute white one) in a fine web on the underside of the leaf.

I am inclined to think it is the insect known in the west as the red spider. Professor Cordley, of Oregon Experiment Station, recommends the lime, sulphur and salt solution after leaves have



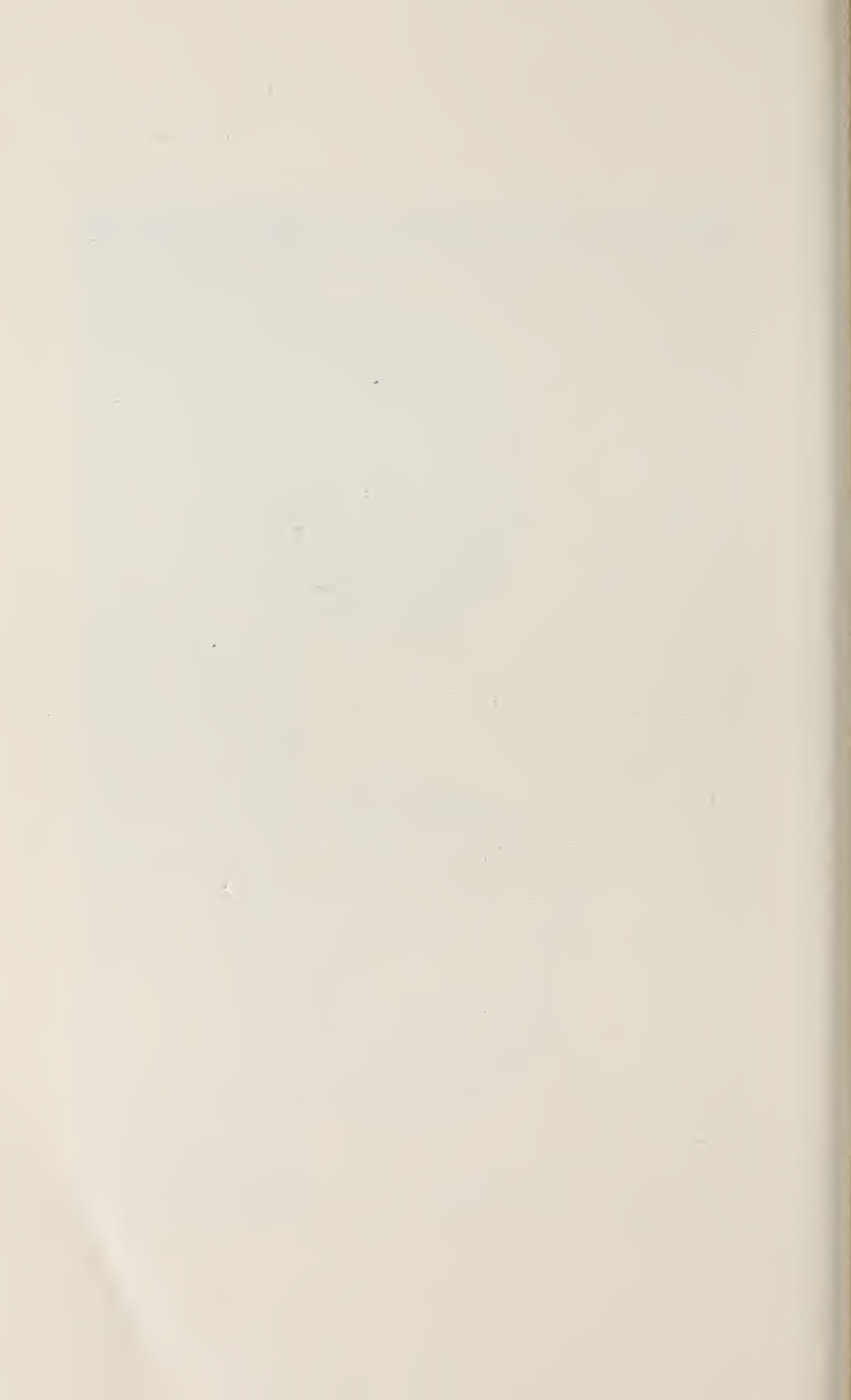
ESORUS SPITZENBURG. Large, red on yellow ground, very acid.
good cooker, tree hardy. April to May.

BETHEL. Medium size, quality good. Season late.



RED CHEEK PIPPIN. No history furnished.

TALMAN SWEET. Small, season late. Little history furnished.



fallen. Canes should be severely thinned to make the spray more effective.

The currant saw fly is in evidence and is successfully combatted with white hellebore, if the first brood is attacked. If neglected until a second brood the crop of fruit is lost on account of the presence of the arsenic.

Gooseberry bush leaves are the first choice of the saw fly larvae for food.

The leaf roller is quite destructive to the Carolina poplars, but succumbs to paris green very readily.

Anthracnose of the Apple.

I would like to call the attention of the board to a disease which has appeared in Flathead orchards, a disease which is caused by a fungus which inhabits the cambium, or inner bark, of the apple tree, causing dead spots on the limbs and on the body of the small trees which, as the fungus increases, become so numerous as to kill the tree. Not until the latter part of the season did I discover that the spot was caused by a fungus, or perhaps would have found many more orchards infested. All the trees which I found infested were bought from the west. One orchard which had been planted on land which cost \$100 per acre to clear, was so badly infested as to be worse than worthless. Which makes it worse the nurseryman who sold the trees knew they were diseased.

I consider this disease, which Prof. Cordley has named the apple anthracnose, to be more serious than the codling moth, inasmuch as the codling moth destroys the fruit, while the anthracnose destroys the tree, and as the spores of the fungus can be carried from tree to tree by birds, wind or the pruning knife, it can be spread fast.

I would recommend that all inspectors be furnished a description of the work of the fungus, with special instructions, as I am satisfied by what I have seen of the results of the disease that it is an enemy to the apple tree second to none.

I am in correspondence with different parties on the subject and am in hopes of giving a supplemental report of this special fungus in Flathead. For a report by the best authority would refer to the report of the Oregon Board of Horticulture for 1901. See page 405.

I find a disease of the Morello cherry, which is very similar to the anthracnose of the apple, which has killed some cherry trees. Gumosis is bad on Bigarreau cherry trees in my district. Many

trees of the Morello cherry died, or partially died, the past summer from the effects of the winter of 1898-99.

Of the trees reported, probably not fifty per cent are varieties suitable to the climate in which they are planted and am safe in saying that not twenty-five per cent are of the varieties ordered by the buyer. Such is the benefit (to the nurseryman) of the substitution clause in the tree contract.

The Flathead Horticultural Society is doing a grand work in educating the fruit tree planter as to varieties and care of trees after planting and deserve the encouragement of the state board. The society has assisted the inspector in every way possible in the discharge of his duties. The merchants and fruit dealers have given their hearty co-operation to make the horticultural law effective. It was some time before they could understand the necessity of destroying empty fruit packages, but think the law is firmly observed now. The local inspectors are badly handicapped by not having an inspector at large to refer to. Where at present it is impossible to get an authoritative opinion in time to be of immediate benefit, the local inspector is supposed, by many, to be authority on all subjects appertaining to fruit and fruit culture. I find it very embarrassing at times when asked as to the honesty of some certain nurseryman, whom I cannot recommend or as to what varieties to plant, there being such a variety of climates in this district. Some parts will grow and ripen peaches, apricots, grapes and nectarines, while in other localities a Ben Davis tree will not stand the winter, but surprises are continually being sprung. The writer did not think it possible to raise fruit in the vicinity of Columbia Falls, but at the September meeting of the county society at that place apples of several varieties were shown, also several varieties of pears.

The Flathead Horticultural society has established five stations at as many different points in this district to keep a record of the variations in the weather, which will be of great benefit to the fruit grower.

The director of the weather bureau at Kalispell is doing a great work for the fruit grower.

Counting fruit trees in lots in town and orchards not found, I am satisfied would bring the total to one hundred and thirty thousand trees in this district.

I did not visit Libby or Troy for lack of time.

Topworking is becoming quite generally practiced and should be much more than it is, as perhaps one-half the trees in this dis-

making the same mistake through the fault of the dishonest nurseryman or tree agent. It seems as though some people never learn by experience to deal with a man they can get at—with a shotgun—if no other way. Very few buyers appreciate the fact that the substitution clause leaves a loophole for many dishonest transactions.

Had all the fruit trees been true to name which have been planted in this district, they would have been bearing \$100,000 worth of fruit at the present time. There has been much dissatisfaction among dealers the past season over small apple boxes shipped from the west. The Montana standard box, 10, 11, 22 inches, containing 231 cubic inches more than those from Washington.

The market for home-grown fruit has been extraordinarily good. Strawberries selling for not less than \$2 per crate, raspberries \$3, plums 5 to 8 cents per pound, cherries 10 cents per pound, apples \$1.50 per box, fancy \$2.00 and \$2.50. Consumers have learned the difference between home-grown and imported fruit. In many instances the growers' name on the package seems to be a guarantee as to the quality of fruit.

I have distributed copies of the report of rules and regulations of the horticultural board, also booklet on insect pests by Prof. Cooley, which were in great demand.

The inspector of green fruits at Kalispell, Mr. O. A. Parsons, deserves great credit for the manner in which he has watched the incoming fruits and outgoing empty packages. I have received and answered eighty-five letters of inquiry.

I am forced to the conclusion, after testing many varieties, and seeing them growing that the pear is not a commercial success in this district, inasmuch as pears can be shipped in here and sold for \$1 per box and has sold that low in Kalispell.

Owing to the size of this district (8,700 square miles) any report made on the basis of sixty days work must be incomplete, as it is impossible to get an accurate inspection in so short a time of all the orchards, there being so many small orchards (from twenty to one hundred trees). The average of those I visited this summer is 285.

In the choice of varieties of apples Wealthy leads largely as first choice. McIntosh Red comes second. For summer Yellow Transparent and Duchess are both favorites. For winter Gano and Aiken Red have many friends.

In plums the Peach, Bradshaw, Pond's Seedling and in more favored locations the Lombard and Italian Prune do well.

tract are valueless as they are, but people must be educated up to that fact before they will understand the necessity of remodeling their trees. The bark graft is the most general in use for apple, although budding is practiced to some extent. Many fruit growers are digging up worthless varieties and replanting, oftentimes

In cherries the Early Richmond, Montmorency Ord, English Morello in the order named make a good succession. The Hearts and Bigarreans have been extensively planted, but do not yield sufficiently to pay commercially.

I wish to express my thanks to Mr. J. H. Edwards, the local member of the State Horticultural Board, for his assistance he has shown on the many occasions in which I have infringed on his valuable time; also the secretary of the state board, who has been uniformly courteous and forbearing with my many shortcomings. I remain yours

O. C. ESTEY,
Inspector Fifth District.

Big Fork, Mont., November, 1901.

Mr. President and Members of the Board of Horticulture:

I have the honor to present my second annual report as orchard inspector of the Fifth Horticultural district of Montana.

Owing to lack of funds I did not make a general inspection the past season, but confined myself to Kalispell and vicinity, and to special cases of pests in other parts of the district. I made a thorough inspection of just 18 orchards containing 18,743 trees, also five acres of small fruits. I made an especially thorough inspection of those from the fact that I discovered the codling moth in that vicinity in three orchards. I inspected many trees in Kalispell for the same insect, but did not feel justified in making a more expensive inspection under my instructions. I did not discover them until the latter part of August, when it was too late to spray, but I picked off and destroyed all fruit from trees infected and banded the adjoining trees. I think a good fight next summer, while there are but a few, would exterminate them.

In justice to the fruit grower I should recommend for next season a thorough inspection of all orchards in that district, which would cost \$500 or more; also that the board should allow as much more to exterminate the codling moth while in its infancy here, as Prof. Cooley thinks the past season was the second season of their depredations.

The native currant saw fly was not as bad as a year ago. Another season of spraying will probably exterminate them. Am pleased to report that the treatment of pear leaf blister, described in my former report, was entirely effective in every case. The apple plant louse was worse than ever the past season and a great expense to the fruit grower trying to conquer them, which cannot be done only by frequent spraying.

Anthrachnose of apple is still in evidence and proves hard to combat, spreading very rapidly in orchards. Owing to the distance between orchards it does not spread from one orchard to another. It seems not to be particular as to the variety of tree or shrub. It has been reported on cherry, pear, currant and even on the quaken asp. I am convinced that the fungus which works on the branches is another species, as it is found in an entirely different locality. I am unable to identify the latter. Have sent away specimens without result. The red spider is still very bad on raspberries and we have been unable to discover any effective remedy as yet.

Apple scab was sprayed twice with strong bordeaux mixture, before and after bloom, without result. Owing to continuous rains while the oyster shell bark louse was in insect form, spraying was ineffective the past season; am going to spray this winter to see if it will be effective.

In February, where the chinook winds removed snow from around trees, many were winter killed. In one orchard there were 1,600 found dead and many more injured and will probably die.

I think it would be a good plan to sow a clover crop in orchards to hold the snow. The market has been strong and prices good for fruit, but on a system of barter, which is very unsatisfactory to the grower. Apple packing is receiving some attention; well packed and graded apples commanding twenty-five to fifty cents more per box than those not graded.

This market demands boxes stamped with the growers' name as a guarantee, which is a good business proposition. Trees are still being planted in large quantities. An estimate of trees planted last spring would place the number at 75,000. There are probably 250,000 fruit trees growing now in this district.

Inspection of fruit at way stations is very necessary. It seems impossible to get competent men to act as inspectors in small towns for the compensation allowed by law. A central quarantine station would entail a hardship on small dealers. Could it not be arranged so the inspector in Kalispell could board the train

as it enters from the west and inspect the fruit in transit; as it is all shipped from the west it would not be necessary on the eastern trains. Yours respectfully,

O. C. ESTEY,
Inspector Fifth District.

Big Fork, Mont., December, 1902.

Few orchards are to be found in my portion of District No. 2. Of these I have visited only those in the immediate vicinity of Helena and the trees in the town. The fruit trees in the town are apple and crab exclusively planted as much for shade as anything else and of small economic importance.

Codling moth is quite general in distribution in the city of Helena and it is an indisputable fact that where suitable trees are to be found it likes life in Montana. Its eradication from the town will be a difficult matter, as apple trees are scattering and more trouble will be experienced with the many owners than with the scarcely more numerous trees.

I have found a comparatively rare insect and this is the first time, I believe, that it has been reported in the west. It is *Xylina antennata*, and made itself manifest on some trees by devouring 10 to 20 per cent of the young apples in the early summer. The insect has never proved serious. Its attacks are usually intermittent and result when worst only in the destruction of a portion of the young apples.

I have met with the apple aphid on nearly every apple tree and it does much harm from its numbers, although its parasitic enemies are very efficient in holding it in check.

In several instances the common red spider has proved injurious to trees during the hot and dry weather of latter summer. I believe that the mites are destined to prove serious pests in Montana if they are not already such. This species alone has done much damage in orchards and in gardens and we have with us another that will prove more troublesome. This is the clover mite, *Bryobia pratensis*. I have seen this mite on the bee clover, *Melilotus Alba*, during the past summer. Its numbers were so great as to make the leaves in patches yards square turn yellow. The bee clover is more of a weed than anything else where bees are not raised. But the mite will take as readily to all clovers and to alfalfa and in the absence of these to fruit and shade trees and to grass. Its enormous numbers in a dry year will make it a serious pest. It often in the fall becomes troublesome when mi-

grating in search of warmer quarters to deposit eggs. On Dec. 3 I was called to a house in Helena where mites in great numbers were crawling over the outside and making entrance into the house, much to the chagrin and disgust of the inmates. Around this house was a well watered lawn, a few flowers and cottonwood trees. This mite must have flourished on the trees during the summer.

The remedy for such attacks is spraying the house and around the bottom with pure kerosene and the lawn with kerosene, one part to nine of water. I suggest that the board provide me with one or more spray pumps, as there will be a repetition of such attacks. In the winter where this mite is abundant a spray pump can do much good by destroying winter eggs. Then, too, insect enemies are on the increase in the town on shade trees, notably elm and box elder, and the time will come when spraying will necessarily be general. I believe that a pump or two furnished me by the board would find extensive use at the present time without further cost to the board and would gradually accustom householders to their use on fruit and shade trees.

E. N. BRANDEGEE,
Inspector Second District.

Mr. C. H. Edwards, Butte, Mont.:

Dear Sir: In reply to your letter of Dec. 20 my observations have been as follows: The quality of the fruit shipped into Bozeman this fall has been excellent and free from insect and fungus pests, with the exception of two shipments made by men who were novices in the fruit business and not regular shippers. Both wholesale and retail dealers are heartily in favor of the inspection, realizing fully the protection it affords them. One retail dealer informed me that since he could secure sound apples free from the codling moth his sales were doubled. I have also heard a number of persons who buy a considerable amount of fruit for home use, remark how noticeable was the improvement in the quality of fruit in our markets since the inspection law had been in force. Yours respectfully,

H. C. GARDINER.

To the Honorable State Board of Horticulture :

Gentlemen: In presenting this, my first report to the board, I will not confine myself to any one subject, but will endeavor to

bring to your notice some of the conditions that need revision and earnest and immediate attention.

First. The law governing inspectors is radically wrong in many respects. The present law limits the time of the inspector to two months in the year and then attempts to cover the remainder of the twelve months by the fee system, which is so arranged that the inspector must pass the fruit in order to secure his fee, thus offering a premium on careless work. The privilege should be given the members to employ the inspectors by the year. The inspector should have an office in the town in which he is to inspect; he should receive a salary in proportion to the size of the place and the corresponding importance of his services. The fee system should be so changed so as to conform to the amendments proposed by the committee on legislation.

The farmer who now drives to town and distributes his diseased fruit to his customers without leave or hindrance should be required under penalty of fine to call at the office of the inspector and have his goods passed upon before he is allowed to sell same. It has been found impossible by the writer to secure the services of a man competent to inspect orchards and I am firmly convinced that the state entomologist and inspector at large should for the present attend to this work. The duties of the local inspector should be to inspect fruit, attend to the collection and destruction of old fruit boxes, to look after the destruction of insect pests by spraying and under the direction of the inspector at large and to conduct the office of inspector and all of the attendant duties as prescribed by the resident member of the board. The secretary of the board should be furnished with printed matter covering the information that the horticulturist needs for his guidance and assistance and should be required to mail a copy of same to each individual address in the state. Such mailing list can be furnished by local inspectors, postmasters, etc., or can be taken from the inspector's books now in the hands of the secretary.

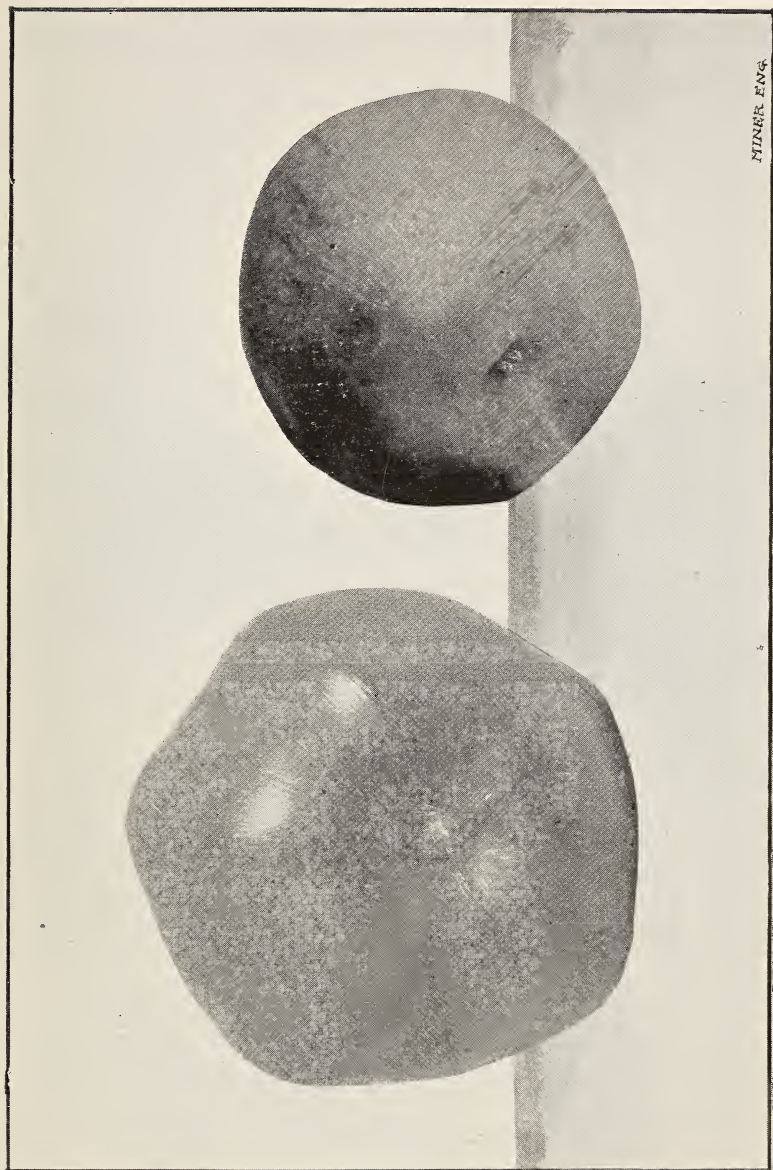
The greatest work that this board can do for the state is, if possible, to rid it of the codling moth. This I feel confident can be done and I would advise that our experimental work be confined to one special locality until the results are demonstrated; then apply the work to all infected districts in the state. This should in no way interfere with the present work of the suppression.

The writer has received very valuable assistance from Prof. R. A. Cooley, state entomologist, and would recommend he be given every assistance during the next few years to enable him to carry



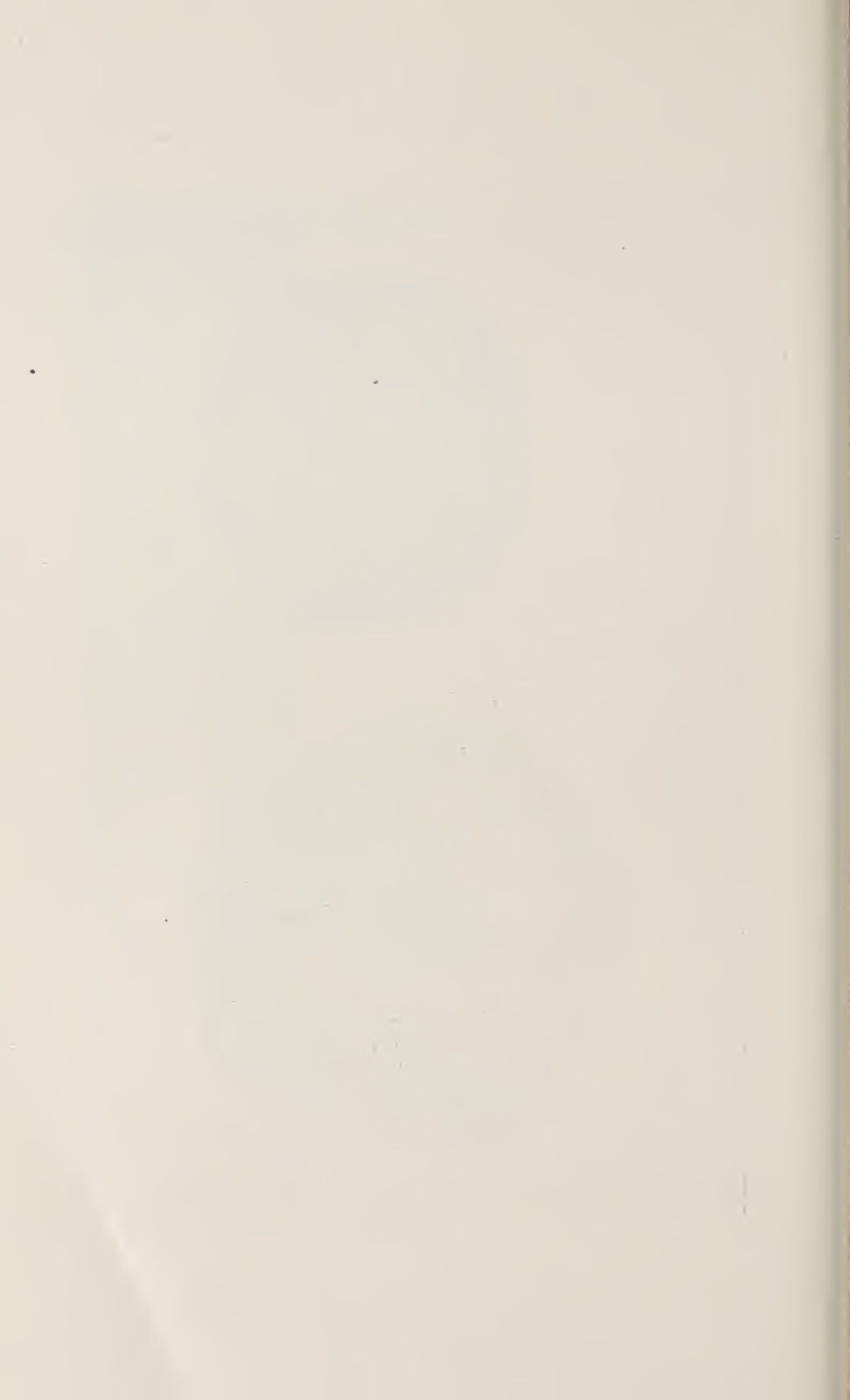
AIKEN. Size, medium; heavy yielder after it begins bearing but late coming into bearing. Semi-hardy, color red, good flavor. March.

BOSTON Russett. Small; poor color. Late keeper.



PEWAUKEE. Large, dull red stripes, tree hardy, but fruit falls badly. Winter.

WEALTHY. Good size, good bearer, tree hardy, color good. Late fall.



on the investigation that he has been conducting to determine the habits of the moth as governed by Montana conditions, which will be outlined to you in his report which I have requested him to make in person.

With the above acknowledged assistance and such information as I have gathered from other sources, I have formulated a plan of work which I feel will effectually rid us of this insect, and I desire to outline it to the state entomologist and to the inspector at large in the presence of the board, and discuss it with them and receive their opinion of same and thus secure the judgment of the members of the board as to the advisability of attempting the work next year.

The board should, in the judgment of the writer, arrange for a committee to look after the legislation that has been formulated by your advice and instruct them to remain in Helena until the work is done and the necessary expense to properly conduct this work be borne by the state.

The work that has been done in my district will be fully presented by the combined report of the inspector at large, the local inspector and the state entomologist.

While the work done has been of a high character and in the judgment of the writer compares favorably with the best work now being done in other states, I object to this board being satisfied with any methods that only secures to us as results in the destruction as only a certain per cent of the insects we seek to eliminate, and I earnestly advocate that we seek for methods that have in them the possibility of utter extinction and of the adoption of quarantine rules that will absolutely exclude our enemies.

Our industries are young and as such can be handled differently from those of other states where age has produced chronic conditions that preclude the possibility of such action as we can take in the inception of a great industry. We have it in our power to produce results that through lack of knowledge not possessed at that time have been neglected by the older fruit-growing states. Will we too allow this opportunity to fall by the wayside or will we arise to the occasion and secure for Montana the title of the only state in the union where apples can be raised without a blemish.

Out of the possible 1,650,000 fruit trees in our state over 900,000 are apple trees and for this reason I have given most of my attention to the insects affecting this fruit, feeling that we can enlarge the yield as the industry expands.

Referring to the codling moth and what might be saved to a

fruit producing state, I quote the following figures: Prof. M. V. Slingerland states "that Prof. Forbes estimated the loss to the state of Illinois from the apple worm in the year 1901 was \$2,375,000, or one-half of the value of the average crop."

The American Agriculturist states that the average annual crop of apples in the state of New York amounts to about 5,000,000 barrels which, figured at \$1.50 per barrel, would amount to \$7,500,000. This paper estimates the loss to this crop from the codling moth at least one-third or \$2,500,000, and adds \$500,000 for the loss of pears from the same cause.

Basing our estimate on the above figures we have in sight the following results: Nine hundred thousand trees that will in three or four years produce an average of at least two boxes of apples to the tree, or a total of 1,800,000 boxes, estimated at 75 cents per box, or \$1,350,000. Taking the last and lowest estimate of loss we have one-third of \$1,350,000 or \$450,000 that can be saved on the present apple trees, to say nothing of the thousands of trees that are being planted each year in our state and making no allowance for the pear, which has been demonstrated to be very successful throughout the apple districts of Montana. By the time this pest would become generally disseminated, if not carefully and thoroughly fought by this board, these figures so far as product in boxes are concerned will be double, and while the increase in quantity will decrease the price it is a fair estimate to say that the increase in the value of the crop in the next ten years will be one-third more than the figures for 1905, or \$600,000, that can be saved to the state, to say nothing of the value to our orchardists, if they can guarantee that they produce fruit absolutely free from worms or other insects. Is this not a prize worthy of our earnest efforts? Should not our state legislature willingly grant us \$10,000 to work with during 1903 and \$5,000 for 1904 to enable us to accomplish these results. I think they should and I believe they will if we present the matter in the right light and show that to accomplish this it must be done now. Other states that acknowledge that it could have been done earlier now simply are satisfied to settle down to an annual fight of the insects with the only hope before them that they may save 75 per cent of their productions from these scourges, while we can wage a war of total extermination if we are supported in our efforts as we hope, and I think have a right to expect we will be by our state officials and law makers.

As to the other insects that we now have to deal with we can successfully combat them and feel that the allowance asked for will enable us to cover the whole ground in a more thorough manner than we have ever before attempted and in better form than has ever before been attempted by a young industry of this character.

I feel it impossible under existing conditions to secure technical knowledge combined with practice and it must be evident to any one conversant with the needs of our work that this is absolutely necessary.

You can see at a glance that the inspector at large and the state entomologist could not even casually view the 1,650,000 fruit trees of our state at the season when they should be carefully examined. They need assistance in the form of local inspectors who have been trained to the work and to secure these results it becomes necessary for us to make the office of inspector one that will be sought after and when secured held by earnest work and strong personal effort. At present I find myself in the position of a beggar seeking some one to perform a thankless and at times disagreeable task, for after the two months time that the present law allows, the office of inspector is simply a dead letter for the rest of the year, except of course in such cities as Butte. What we need is conditions that will induce young men to grow up in the work and such accurate records of the annual work furnished the board as will enable each new member to take up the work where it was left by his predecessor and thus register an annual gain that will eventually insure that high degree of success that we aim to obtain, and in this connection I desire to call your attention to the necessity of keeping all of our workers as long as possible, as each year adds to their value to the state, and I feel that the work of our inspector at large, the state entomologist and the secretary would insure them for a continuance in the service, as to them we owe the credit for such success that has been so far attained, and while it is difficult to distinguish between the relative importance of these three offices it might be well to note that practically all of the work must and should come under the direct supervision of the inspector at large and on his merits we must stand or fall, and feeling as I do that we now have the right man in the right place and that each year's work will add to his efficiency, I would recommend that every assistance and the unquali-

fied support of this board be given Mr. E. N. Brandegee in this work. Very respectfully submitted,

C. M. ALLEN,

Member of the Fourth District.

Lo Lo, Mont., December, 1902.

Montana is free at the present time from many of the plant diseases and injurious insects which inflict older, more thickly settled communities. The greatest pests in the animal and vegetable kingdoms are travelers from abroad, journeying with their favorite foods, under suitable conditions, and head of the enemies to which they are subject. Insects and fungi have not increased in actual numbers, but the food plants of a limited number have been multiplied by civilized life. Montana is not exempt from all of these pests by any means, nor has intercourse with other communities been so intimate that she has as large a proportion as other states with which she may be justly compared.

Injurious insects and fungi are more abundant and destructive in warmer than in colder climates, generally also at lower altitudes than the higher, but it is also true that where a plant flourishes, its peculiar enemies are apt to be abundant and destructive as elsewhere. Climatic conditions undoubtedly exert a great influence and there are many exceptions to the general rule. The Montana plum, for instance, will be in all probability forever exempt from Monilia, and the Montana apple from common parasitic rots, and perhaps from scab, but the codling moth has demonstrated that it is well equipped for life in Montana. In the city of Helena during the past year fully 95 per cent of the apples had worms in them. Climatic conditions will afford protection against a few pests. Isolation will grant immunity for a time. Intelligent care and eternal vigilance exerted at this time, early and therefore favorable, will accomplish most for agriculture and horticulture in the state in saving destruction by insects and fungi.

A few of the serious pests of the state are native. These are exclusively those that have lived on species native to the state and species closely related to the cultivated plants.

As in all countries the most serious horticultural pests come to Montana from abroad along with the cultivated plants upon which they feed. Nursery stock and fruit are vehicles for transportation most used. Of the two, fruit imports at the present time one pest alone, but this the most serious, the codling moth. Nursery stock from out of the state brings many more kinds, and is liable

to continue, as it is more important than all other agencies combined in the transfer of horticultural pests from other states to Montana.

I wish to impress upon the board the imperative necessity of making its supervision, inspection and fumigation of nursery stock that comes from abroad as efficient as they can possibly be made. Also to impress likewise the necessity of a more rigid inspection of all nurseries in the state and to insist that each of them build in connection with it a suitable chamber for fumigation of stock and see that that where stock needs treatment it is duly given.

By these means horticultural interests will be saved much damage that now accompanies the planting of trees and shrubs from the insect pests that go along and flourish on them like the green bay tree. Aphis has been distributed throughout the state on nursery stock and the widespread destruction this year from these insects can be traced directly to nurseries in and out of the state.

Orchard trees naturally from their pecuniary returns attracted first attention and efforts of the board and the horticultural law primarily was designed to help and protect these interests. The large number of apples, plums and cherries planted since in the state is due in not a small measure to the operation of the horticultural law and the returns from bearing orchards indicate the wisdom of the law and the ultimate large profits to the state. The commercial raising of fruit is extending too into localities a few years ago supposed to be not adapted to it, and without doubt it is a certainty that Montana is destined to become one of the largest apple raising states of the Union.

With the glowing hope of such a future for fruit raising and without neglecting any means to stimulate its fulfillment and especially by indulging the pests that prey upon the apple, we should bear in mind that other fruits are raised and will be raised in greater quantities in Montana, and that there are other trees whose fruit is not useful which, from the shade they give, beautify, adorn and give value to the cities, great though not to be estimated in dollars and cents.

The shade trees of the state were chance affairs until a few years ago. Perhaps Butte set the standard and it was enough for most cities if they had more trees than that place, whose verdure is beneath the ground. Great Falls took the lead in general planting of trees in her streets, and she deserves commendation, not only for the larger beauty that is hers, but also for the stimulus that her action gave to other cities. There is constant co-relation be-

tween nature and the mind. The parking of Great Falls has a moral, aesthetic and educational value in a state of sparse timber and more cities than have already been her imitators should profit by her example.

Ash and elm are the trees used most extensively at the Falls. The ash is affected by an aphid which occurs nowhere else in the state to my knowledge. Elm trees suffer everywhere in the state from the ravages of elm aphid. *Schizoneura Americana* and cottonwoods need to be rapid, vigorous growers to sustain themselves against the many pests that prey upon them, aphid, saw flies, and in the Falls by colonies of epidopterous larvae, which live in colonies in the trunk, and throughout the state by maggots of a fly which deform young trees and mar the older ones. In the Falls also the fungus *Melampsora populina* perforates the leaves of at least two species of poplar.

No hardwood tree has been more extensively planted in the state than the box elder and this is subject to the attacks of more species of insects than any other shade tree in the United States. The box elder plant bug has been reported from Red Lodge and will probably spread to other portions of the state where its food grows. The box elder plant louse, *Chaitophorus negundinis*, occurs in many cities of the state at the present time. It is constant in its depredations and undiminished apparently from year to year in numbers. So serious has it become in Helena that box elders prove unsatisfactory and untidy trees in door yards. Honey dew, excreted by these insects, covers foliage, branches, trunks, fences and walks and becomes plastered with dust. The leaves turn a greenish yellow and three-fourths of them fall prematurely in the season. Many parasites of this aphid may be seen, but they seem inadequate to keep down the numbers.

The time to spray for aphid of all kinds is early before the buds open and again just after they open. Later spraying is of little benefit. Contact poisons, kerosene, whale oil soap, tobacco decoction or quassia chips should be used. Never hope to destroy aphides with arsenicals like paris green. Energy is wasted and money thrown away every year in this vain endeavor and in one instance that came to my attention last summer, on a large scale.

One of the spraying outfits belonging to the board has been shipped to Helena and plans have been perfected for combatting the box elder plant louse in that town. Other cities of the state will eventually be obliged to deal with pests of their shade trees

and it would be well for inspectors to stimulate commercial spraying under the supervision of the board.

Clover Mite.

No insect in the state causes more consternation to the good housewife than the clover mite, *bryobia pratensis*. It has been reported once before from this state, from McCarthy Mountain, to the Department of Agriculture. It is probably of general distribution and often causes needless alarm to people from its habit of invading houses in the spring and fall.

The mite is about twice the size of the ordinary red spider. It has four pairs of legs and the anterior ones are very long. The normal color of the insect is red, but in strong sunlight may show other hues. I have found the insect feeding on a great variety of plants. Its favorite food is undoubtedly clovers, but it also affects fruit trees.

At times it may prove destructive to these plants from the enormous numbers in which it congregates. But my attention has been called more to its annoying characteristics and in half a dozen instances. In the spring and fall the insects migrate in search of winter or warmer quarters. In myriads at these times they invade houses, crawling through cracks of window frames until the good housewives imagine that their houses are filled with them. As a matter of fact the insects remain by the window and do not get away from the sunlight. Insect powders do but little good at such times, but kerosene sprayed over them is a good remedy for those inside and in case of a severe attack the outside of the house may be sprayed with pure kerosene and the lawn with kerosene ten times diluted.

Red Spider.

Last year the red spider which, when occurring outdoors in Montana is always *Tetranychus bimaculatus*, was destructive in gardens and to fruit trees in different portions of the state. This is also a mite and like the clover mite loves dryness and may be expected at times to flourish in our dry climate and in dryest years. Kerosene emulsion or whale oil soap diluted twelve times seem to be effective remedies.

Root Nematodes.

Greenhouses have called me in many instances to stop the ravages of diseases or insects. The most serious trouble encountered among them and the only one that has yet had no satisfactory solution are those where rose roots are affected with the root nema-

tode worm, *heterodera radiculicola*. I have conducted experiments designed to kill this parasite, which when well established reduces the number of blossoms to one-fifth of normal production. Carbon bisulphide and sulphuric acid after due trial proved worthless. Kerosene in any form seems no better. Formalin, one part commercial to one hundred parts of water, so far as can be determined at present, kills most of the parasites, but leaves enough to again infect the bed. The liquid was applied after a thorough watering, but even with this precaution the plants were severely checked. Formalin has not proved a remedy, though it is worthy of further trial. At present I am experimenting with creolin, but it is yet too early to say with what results.

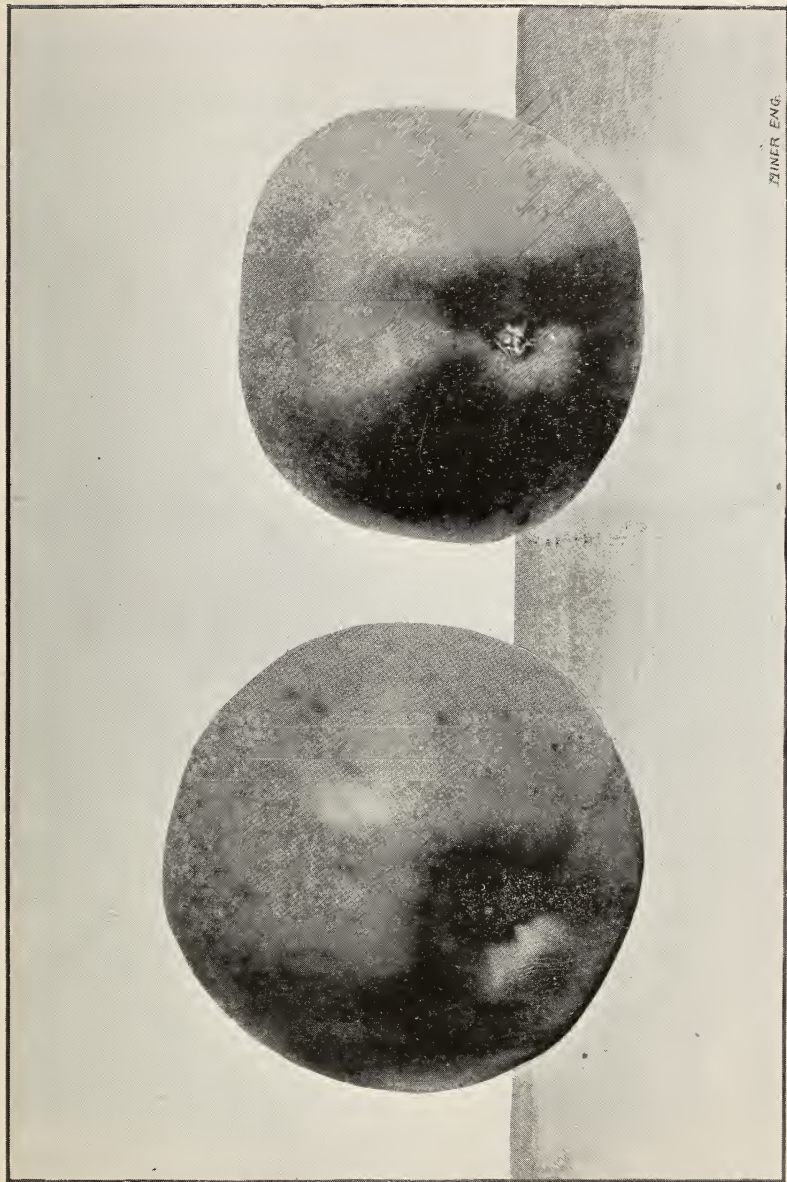
Heterodera radiculicola is a sub-tropical pest and probably will not endure Montana winters, though it is said to persist out of doors in Michigan. It is a most serious pest to florists, rendering roses a financial failure. If no remedy is discovered and none is known at the present time, it is necessary in combatting it to sterilize with steam all soil used in greenhouses affected. And I may say here that there is not a greenhouse devoted to roses, carnations and to many other plants that could not double its production by proper steam sterilization of soil. The fungus, *rhizoctonia*, is widely abundant and destructive among them and this and a host of other parasites could be done away with at small cost and insure larger returns to the labor and capital invested.

Plum Curculio.

These states have considered that evenings were too cool with them for the curculio to lay her eggs and that their plum orchards would never be menaced by this pest. Temperature conditions in Montana seem more unfavorable for the insect. The finding of it here indicates that the immunity of states west is due solely to the fact that the insect has not been introduced.

Commercially this insect is already of importance to us. Plum raisers will be obliged to combat it as it will probably persist and spread.

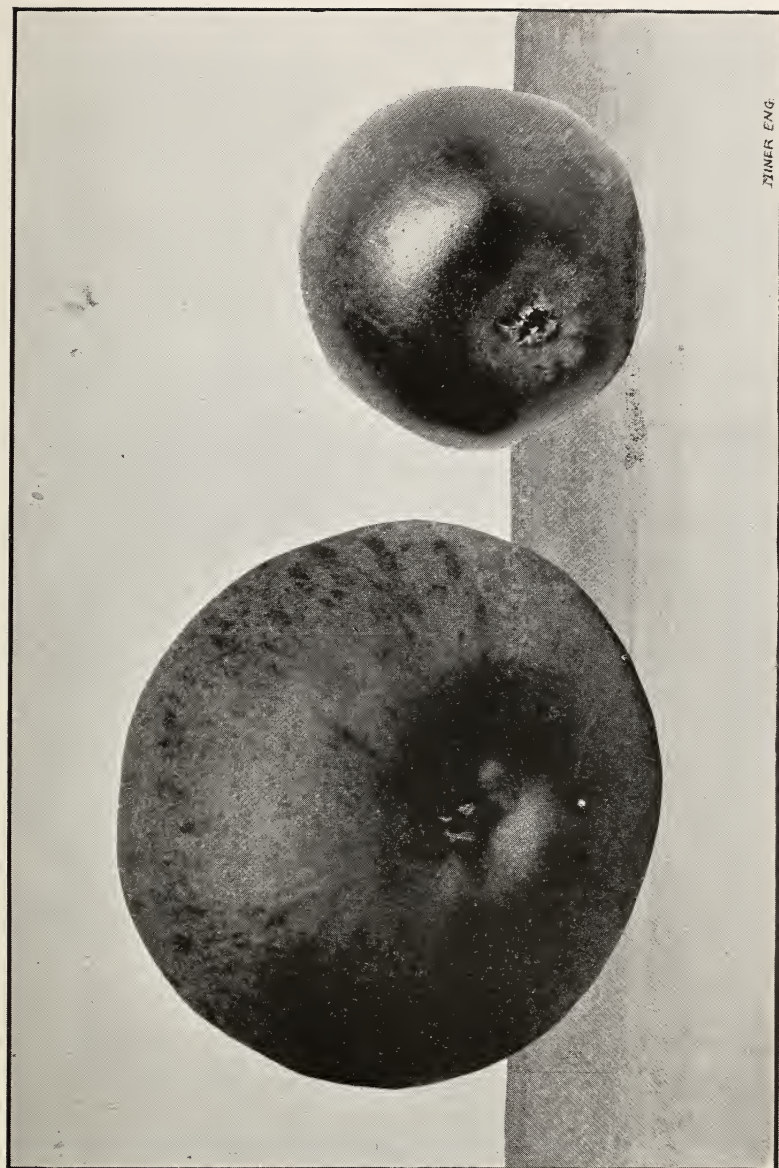
The curculio is a beetle somewhat less than a quarter of an inch in length and has a long snout. It passes the winter in protected places, leaving them in the early spring for plum trees. As the leaves put forth in summer the snout beetles feed for a short time on the leaves. When the fruit has attained a certain size the curculio lays her eggs. She lays about one hundred and fifty, selecting a plum for each egg, which is deposited in a hole made in the side of the fruit. As this is hard and is growing at the time



THINER ENG.

LARGE. Fairly colored; fair flavor, tree semi-hardy, good bearer.
April.

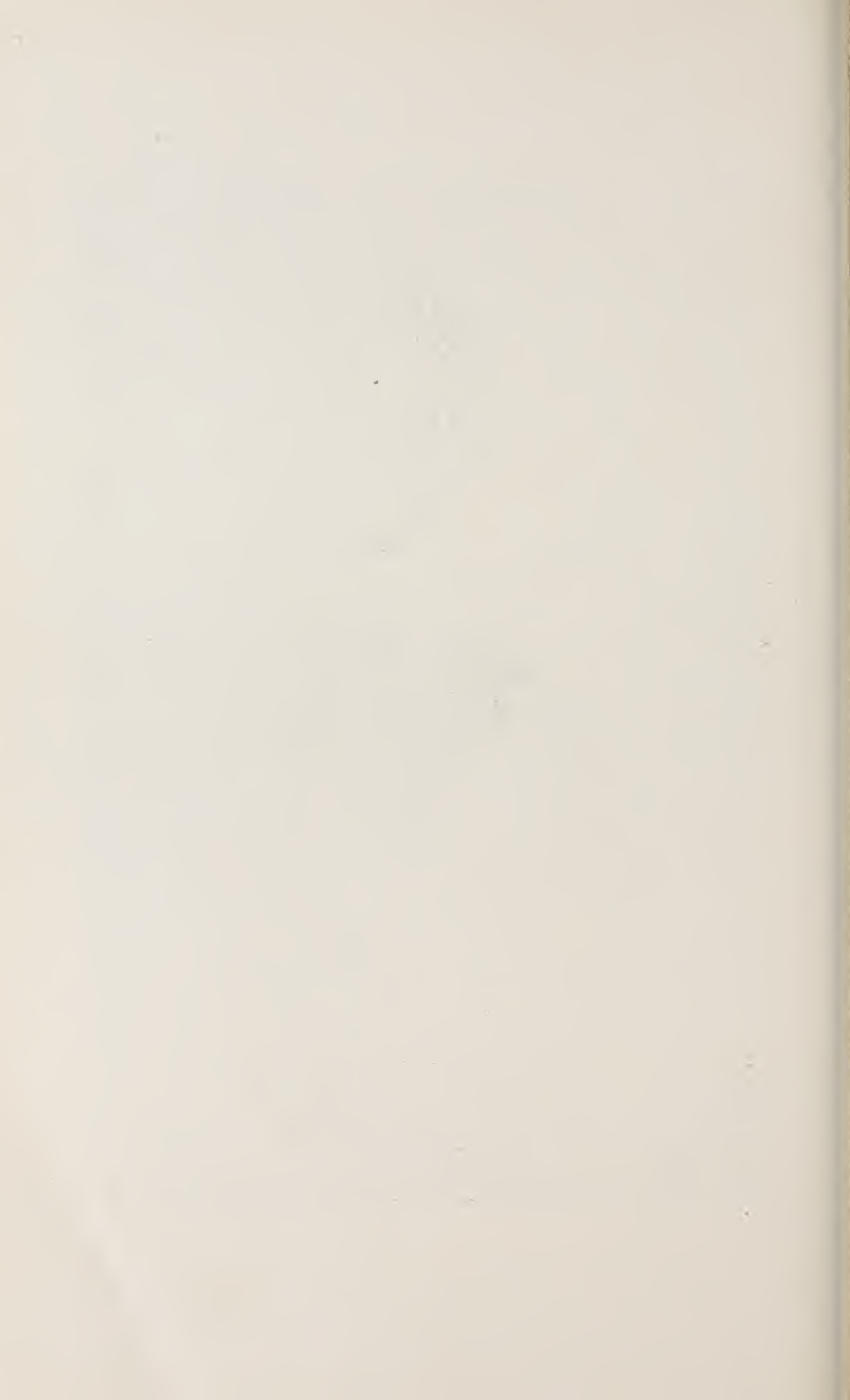
McINTOSH. Medium, October 1st, good bearer,
handsome color, hardy. November to January.



ZINER ENG

TWENTY OUNCE PIPPIN. No history sent with specimen.

ISHAM SWEET. January to May.



vigorously, the egg would be crushed if parental care were not exercised. The curculio makes an incision through the skin around the hole in which the egg is deposited, thus guarding against this contingency.

The incisions pour out a gummy substance observable usually on the surface of the plums that have been stung. The eggs hatch in a few days and the grub eats his way to the stone. Here he lives for about three weeks. Meanwhile the plum may or may not have fallen from the tree. In any event, if alive, the grub issues, goes into the ground, pupates in a month and becomes a beetle, which passes most of its life in the ground.

Known methods of treating this insect are far from satisfactory. Spraying with paris green before the blossoms appear and when they fall (never when they are blossoms on the tree) is one of the preventives used. Spreading cloths under the trees and jarring them night and morning when the insects are inactive is also effective, as is also the plan of gathering windfalls each day. Many orchard owners pasture pigs or poultry beneath the trees. All these methods together will insure a fair crop of plums where the insects are most prevalent.

Codling Moth.

This most dreaded enemy of apples was brought into the state in infested fruit. It now prevails in orchards at Helena, Missoula, Kalispell and Thompson Falls. The insect seems an older resident of Helena than any other place I have visited and nearly every apple in the town the past year had a worm housed within it and some apples had as many as three at the same time. The fact that the moth flourishes in Helena is a sure indication that no climatic conditions of any community in the state will render it immune from the destructive work of this pest.

In Missoula the infestation is very much less, compared with the greater number of fruit trees and the apples on them. Throughout the town, however, the moth is everywhere abundant. Many of the trees are old and their shaggy bark an ideal habitat for the insect.

Situated at the foot of the Rattlesnake and Bitter Root valleys, Missoula is a natural distributing point of all commodities to a great extent of territory. In these valleys are located some of the chief orchards of the state and physical conditions are favorable for a vast extension of the industry of apple raising. The prevalence of codling moth in Missoula is therefore an alarming fact and one ominous to fruit growing in the state.

The board resolved to do what has never before been attempted—to extirpate the moth from a locality where it is firmly established. With this end in view all fruit trees in Missoula were early in the season scraped and pruned. Just after the petals had fallen, in the first part of June and again from the 13th to the 25th of August all apple and pear trees were sprayed. Paris green was used and forty pounds of arsenate of lead was also applied. Bands were put on the older trees and faithfully visited. The results of the work were gratifying.

The life history of the codling moth in the western states is somewhat different from that laid down by eastern experts. The spray applied immediately after petals fall had always been supposed to be most efficacious until the publication of Prof. Cordley's bulletin based on observations at Corvallis. This is supplemented by experiences of practical orchardists. While they do not condemn the first spray as useless, they all believe in the greater usefulness of later sprays.

At Corvallis egg laying does not begin until June 25th. In Montana, so far as I have observed, egg laying begins somewhat later and extends to the 20th of July and perhaps later. Blossoms were all off the past season June 1st. The first spray then had to remain a month on the trees to be effective, when the first larvae appeared. This would be possible with some of the poison in the calix of the apple, but not with that on the sides washed, as they were by our heaviest rains.

Observations confined at most to a few years are useless, especially so in mercurial Montana, and it is with certain reservations that I make this recommendation to the board, based largely on the experience of the past year. But I believe it would be best in future work to disregard altogether the time of the falling of the blossoms and apply no spray at this time. The later sprays are most effective. The development of the moth will vary each year and no time can be definitely fixed in which to spray. The usual period, however, will be from June 25th to September 15.

Rainfall is light during most of these months and loss will be correspondingly small.

I cannot think that the work thus begun, and well begun, will cease until the object of it, the extinction of the codling moth at Missoula, has been accomplished. To carry on the work effectively next year at least four sprays should be applied and if the rainfall is large, more will be required. More bands should be used and, as in the past season, visited and the larvae killed.

It will be news to some members of the board that codling moth has been discovered in orchards at Kalispell. Mr. O. C. Estey found about one hundred apples infested with the pest in one orchard at that place and a few in several other orchards in the same town. This is a most serious occurrence, more so than the presence of codling moth at Missoula. Infection will spread easier from Kalispell than from Missoula. A more unbroken line of orchards leads out from the former town and the temperature is slightly milder. The moth would be more troublesome there if established and most troublesome if ever introduced to orchards surrounding Flathead lake.

The excursion of R. A. Cocley and myself through the Bitter Root valley demonstrated to the satisfaction of both that codling moth does not exist in that valley. We visited the oldest orchards and not a sign of the insect was found. Nor has a moth so far as determined ever been found in this valley. At Lo Lo were found a few apples with marks upon them that superficially resembled the characteristic holes made by the codling moth. But the resemblance was only on the outside and the small tunnelings in the apples indicated the work of some other lepidopterous insect, probably native to that valley and which is unknown. Very few such apples have ever been seen, but they probably gave the unsupported foundation to reports sometimes current that apples with codling in them have been found in the valley.

Crown Gall.

The most destructive pest of Missoula and the Bitter Root at present is crown gall. I have personally pulled up at least a hundred trees that had died from this disease and probably it is the cause of death of thousands of trees in the state. It may be recognized by a swelling at the crown of the tree and often by similar but smaller swellings upon the roots. The swelling is of a warty texture, decays rapidly and frequently becomes the abode of worms and other animal life. But the crown gall is, according to Toumey, caused by a slime mould fungus. This fungus also causes similar swellings on peach, pear, plum, apricot, cherry and raspberry. The disease is highly contagious, will spread from tree to tree in an orchard and will persist for years in the soil.

This disease came into the state on nursery stock. It is known in nearly all states of the Union, but is probably more destructive in dry countries. It is primarily a disease of the nursery row where it often exists only in sections.

Purchasers of trees and inspectors of the board should be fa-

miliar with crown gall, as it is proving the cause of great losses. Trees infected with it should never be planted. All authorities on this somewhat mysterious disease agree that young trees affected with it are worthless.

Apple Bud Moth.

This summer the apple bud moth, *tmetocera ocellana*, was discovered in Missoula by the inspector, J. O. Read. The extent of infestation indicated that the insect has been present at this point for many years. So far it has been found on plums, cherry, apple and pear and is likely to become, if it is not already, a serious injury to these fruits in Missoula.

The insect passes the winter in inconspicuous curcoons attached to the branches and in this way are conveyed from state to state on nursery stock. In the spring the larvae emerge and as soon as leaves have expanded attack the terminal buds, eating both fruit and leaf. To secure themselves from the observation of enemies they tie and roll together several leaves, forming a tubular case in which they hide during the day. To young trees they are especially injurious as they deform and the future growth is liable to become misshapen.

This insect is exceedingly difficult to treat, as it is protected by its case against most poisonous applications. Spraying with paris green, however, does much to lessen their numbers.

Pear Leaf Blister Mite.

This microscopic mite which causes red and black blotches on the leaves of the pear is of wide distribution in Western Montana.

Aphis.

The past summer has been a proverbial aphis year. Aphides of all kinds have been peculiarly abundant and destructive. The most serious has been the apple aphis, which occurs practically over the entire state and apple trees are rarely seen entirely free from the pest. Fumigation with hydro-cyanic acid is a complete remedy. Kerosene emulsion applied before buds have burst and again just after is the only effective time of spraying for aphides and especially those species which curl leaves.

Cherry aphis and plum aphis have been correspondingly as abundant. Known remedies for these are the same as for apple aphis.

Oyster Shell Bark Louse.

Oyster shell bark louse is abundant at Lo, Lo and has been reported from Kalispell. This is a scale insect and a near relative

of the San Jose scale. It shows a tendency to spread in localities where it is established, and although a minor pest should be extirpated.

Tarnished Plant Bug.

Native and abundant over the state on fruit trees and shrubs, wild and cultivated. Injurious to strawberry blossoms, to cultivated asters and in greenhouses to chrysanthemums.

Wooly Aphis.

I have never met with wooly aphid in Montana. *Schizoneura tessellata*, a nearly related species, is everywhere common on alders.

San Jose Scale.

This bark louse, so much dreaded, has never yet been reported as occurring on trees in Montana. The inspection and fumigation of nursery stock probably has kept it out, but inspectors should be ever on the watch for it, to the end that when it is introduced, as it is liable to be at any time, it may be promptly eradicated. If San Jose scale is introduced infested nursery stock that escapes fumigation will probably be the means by which it comes. It is not liable to spread from infested fruit.

Apple canker, pear blight, apple anthracnose and scabs of the apple and pear have never been found to my knowledge on Montana trees or fruit. It is well to be on the watch for the first two especially. Hail marks are sometimes frequent on young trees and inspectors should not be misled by them.

The Codling Moth—(*Carpocapsa pomonella* Linn.)

The codling moth is the common worm of the apple and is familiar to us in fruit that comes from other states. In this form of existence it is well known. But few orchardists have ever seen the eggs out of which hatch the worms and still fewer the adult moths which lay the eggs.

The moths immerge about the time the blossoms of apple and pear begin to fall. They are beautiful insects, expanding about three quarters of an inch. Their fore wings are colored with gray and crossed by brown lines. Near the hind angle of each is a large dark brown spot, marked with streaks of bronze and gold. The hind wings are of a lighter grayish-brown color, darker toward the outer margin.

After lingering around for some time, flying by night and hiding by day, the female moth proceeds to lay her eggs. These are deposited usually during the early evening upon fruit, stems or

leaves of the apple and pear. About one hundred and fifty eggs are laid by each, and soon after the mother moth dies.

The eggs are about the size of the head of a pin, white or with a yellowish tinge. They hatch in about ten days. From them immerge minute larvae which wander around for some hours over the surface of the apples seeking a suitable place to start a tunnel for the center of the fruits. This is usually with the first brood, the calix end. About sixty per cent enter the apple from this place and the remainder enter from the sides or where two apples touch.

In all instances the young larvae prefers a protected location to begin work on his tunnel. This selected he begins eating his way to the center of the fruit. He feeds upon the substance of the apple as he goes and pushes his castings out of the mouth of his tunnel. A week or longer is spent by him in getting to the center. Here he feeds upon the seeds and fills the chamber with his castings. He remains here twenty or thirty days and grows rapidly in size. When nearly full grown he makes another tunnel to the surface. The mouth of this tunnel is often at the calix but oftener in the side of the apple. For several days this exit hole is kept closed by a web spun by the insect and by castings. These are pushed out by the insect when it leaves the fruit.

The apple at this stage may or may not have fallen from the tree. In any event the larvae of the first brood on immerging from the apples looks for a suitable place to undergo transformation into a moth. Some crawl back to the limbs and trunks, some let themselves down by threads to the ground and reascend the trunk. In all instances a protected location is secured which may be under outer bark, in crevasses of the tree, under bands, on rubbish about the tree and possibly in the ground.

A silken cuccoon is spun by the larvae. In about three days he becomes a pupa. In this state he remains two or three weeks. At the end of this period he comes out again a moth. The females again lay their eggs and a similar round of life is completed. The last brood spend the winter in the larvae state in cuccoons made much securer and stronger than those constructed by the first brood.

Much discussion has been aroused over the number of broods of codling moth in the northwest. Some observers have reported as many as four and three or four were recognized in this region until Prof. Cordley published his observations on the insect at Corvallis, Oregon. Prof. Cordley reports two broods, which is the usual number at the east. Careful observations on this diffi-

cult problem indicate that the insect is two brooded at Helena and probably at Missoula, with no indications of a third brood.

Codling moth occurs within this state at Helena, Thompson Falls, Kalispell and Missoula. At Missoula and Kalispell large and important commercial orchards are threatened. This insect is the greatest foe to the apple industry known and one of the most difficult to combat. It destroys half the annual apple crop in many of the states and if prevalent over Montana is capable of causing an annual loss of half a million each year.

The position of Montana is unique in the world, as this is the only place where apple raisers do not pay annual tribute to this insect. Other states regret now that they did not take steps to keep out the moth when they were in the situation where this state is now. No means within reason should be spared and all methods should be tried to keep out this insect and to eradicate it where it now prevails.

Paris green, one pound to one hundred and fifty gallons of water, and later one pound to one hundred gallons, was used at Missoula last summer against this insect. Arsenate of lead, one pound to fifty gallons of water, was also used. The latter is a preferable spray. Bands were put on the trees as traps for the larvae. These methods diminished very much the numbers of the moth. In commercial orchards of infested regions where these methods are diligently employed, about 95 per cent of the apples are marketable.

Prof. Slingerland has given a full and complete history of the codling moth in Bulletin 142, Cornell Experiment Station, 1898, and Prof. A. B. Cordley in Bulletin 69, Oregon Experiment Station, has made valuable contributions to the knowledge of the insect's habits under western conditions of life.

The San Jose Scale—(Aspidiotus Perniciosus, Comst.)

The San Jose scale is a native of China. From the Celestial kingdom it was imported into California and first observed in this country at San Jose. That city owes not a small part of its fame to the common name which it has conferred on this insect. From this center of infestation it has spread over nearly all states of the Union and occurs in Canada.

The insect has never been found in Montana. All inspectors of the Board of Horticulture are constantly on the watch for it and in all probability its advent will be promptly announced if it ever comes. The careful inspection and fumigation of nursery stock has probably kept us free hitherto and if it ever gains a foot-

hold the early knowledge of its presence will render extermination easy. Infested nursery stock is the vehicle of transportation from one state to another.

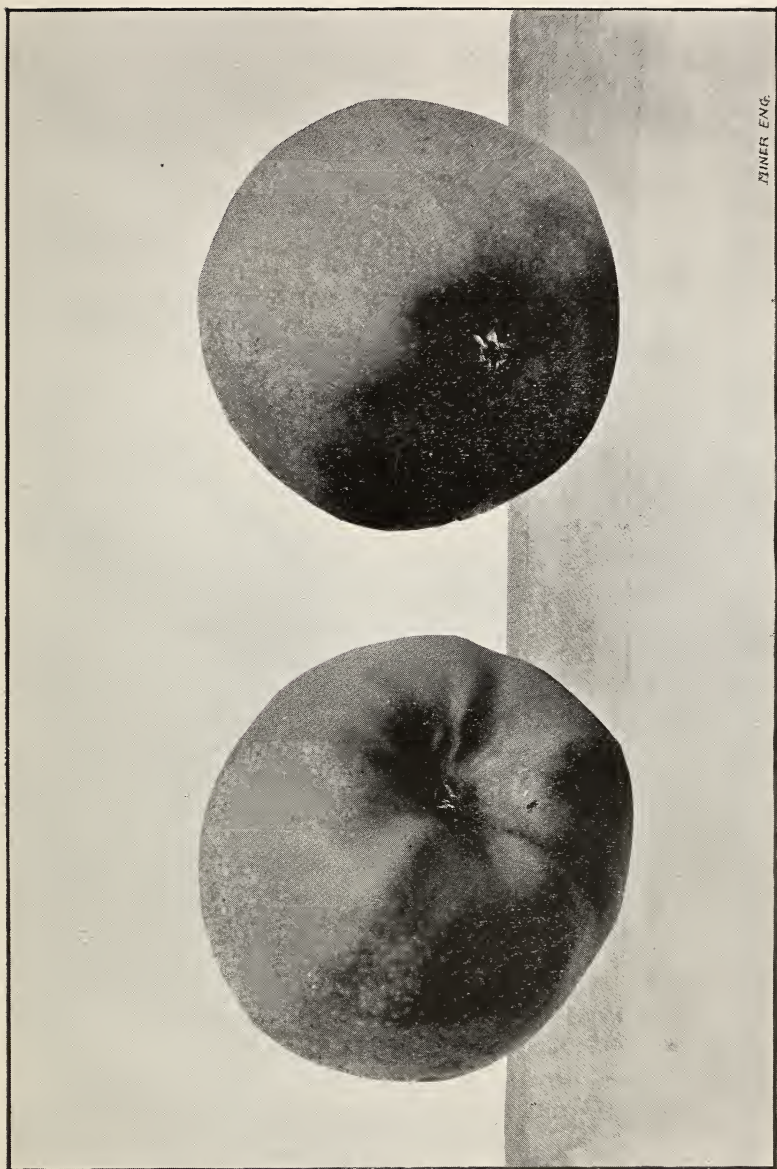
The San Jose scale attacks all parts of the tree. It is a small insect less than a sixteenth of an inch in length. It owes its great destructiveness to enormous powers of propagation, each female being capable of producing a billion descendants in a season. Each insect sucks the plant juices and their great numbers sap the vitality of all trees attacked. Peach trees are ordinarily killed outright in three years from first infestation. Apple, pear and most shade trees lead a lingering, anaemic life.

Almost all varieties of trees and shrubs, fruit bearing or otherwise, are attacked by this insect. Shade trees of cities suffer as well as orchards. In Washington and Idaho willows and poplars that line the streams are thickly infested and furnish ever ready contagion to orchards. It is along streams that the spread of the insect is most to be feared in Montana.

The insect is one of the armored scale insects. Many near relatives are known and exact identification is not an easy matter. It is commonly supposed that this scale insect differs from all others from the peculiar reddening effect its presence has on surrounding tissues of bark and fruit. On young shoots this is often the case, and on many fruits, notably apples and pears, the red circle is usually in evidence. But on old bark the work of the insect exhibits a scurfy white or yellowish-white color. On dark plums no reddening is ever observable. There are many fungi too that make red spots on fruit. This occurs often on Belleflower and some other varieties of apples, and on peaches and apricots are marked by a fungus that causes red blotches that superficially resemble closely the San Jose scale.

In all instances where the presence of this insect is suspected on trees in Montana, specimens of infected bark should be sent to the Board of Horticulture or the local inspector or the inspector at large.

The insect spends all its life but a few migratory hours attached to the bark in one place. Secretions from its body form the scale, which is always more or less convex. The San Jose scale differs from most other insects in the fact that its young are produced living from the body of the mother. The young larvae are born during a period of six weeks, at the end of which period the parent dies. They are orange yellow, microscopic in size, body oval, six-legged and with two feelers. The long thread-like proboscis with



FLORA MUNDI (intended we suppose for Glori Mundi) no history
sent to this office.

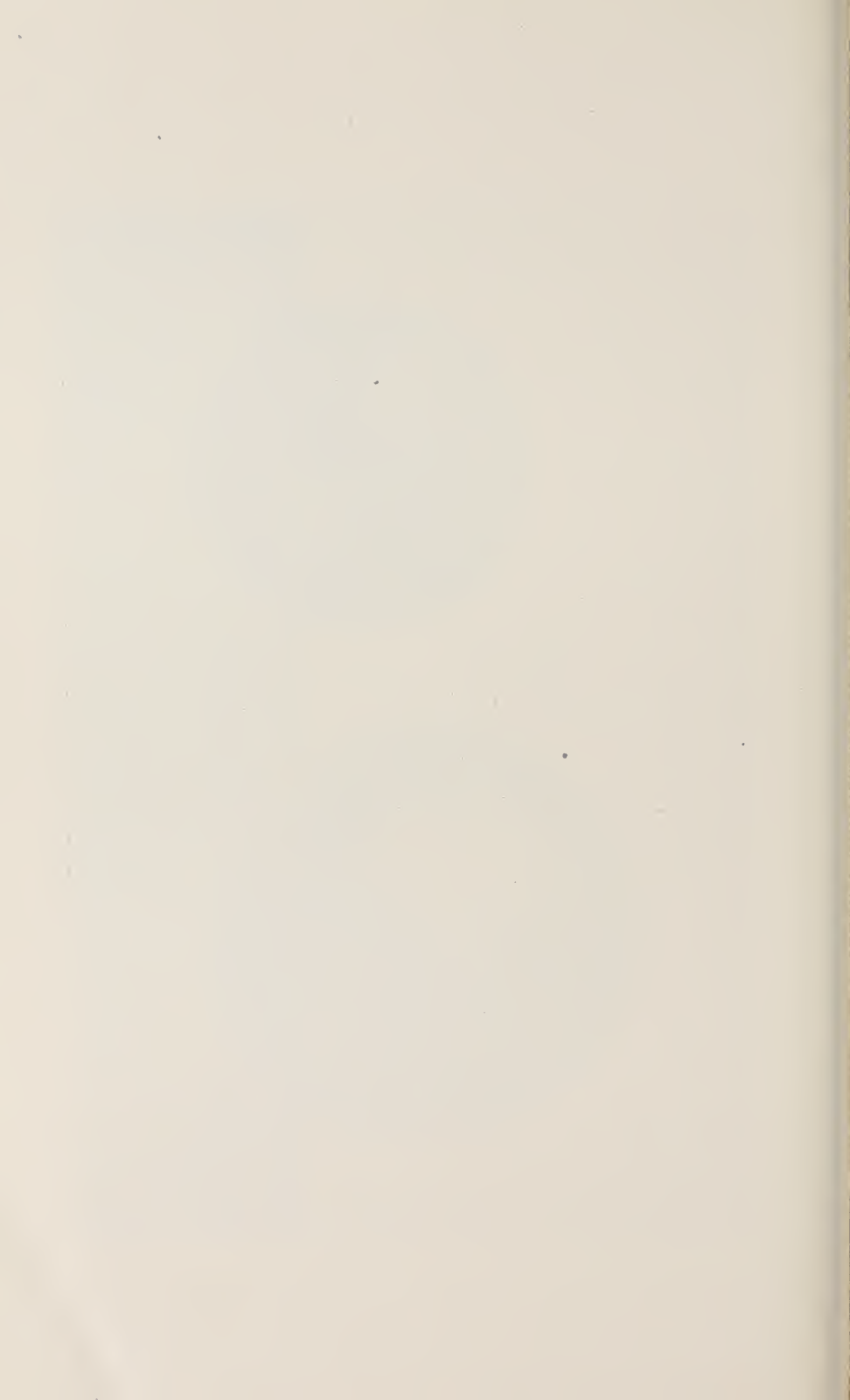
PARADISE SWEET. History not given with specimen.

NINER ENG



GANO. Heavy Cropper, tree hardy, color red. April to June.

WAGENER. Medium size. Late keeper.



which the plant juices are sucked, is doubled underneath, the tip only projecting.

Dr. L. O. Howard and Mr. C. L. Marlitt have given a full account of the life history of this insect in Bulletin 3, new series, U. S. Department of Agriculture, Division of Entomology, and the following description of the scale is taken from their excellent treatise :

Scale of female—The scale of the female is circular, very slightly raised centrally, and varies in diameter from one to two millimeters, averaging about one and four-tenths millimeters. The exuviae is central or nearly so. The large, well developed scales are gray, excepting the central part covering the exuviae, which varies from pale to reddish yellow, although in some cases dark colored. The scale is usually smooth exteriorly or sometimes slightly annulated, and the limits of the larval scale are always plainly marked. The natural color of the scale is frequently obscured by the presence of the sooty fungus (*Fumago salicina*).

Scale of male—The mature male scale is oblong oval, nearly twice as long as wide, and averaging in length about half the diameter of the female scale. The position of the larval scale is marked by a nipple-like prominence located between the center and the anterior margin of the scale. The scale of the male is usually darker than of the female, sometimes black, but often gray, the larval scale covering the exuviae very frequently light yellow as with the female. Not uncommonly the circular scale, formed prior to the first molt, is black, while the later additions, giving it its oblong shape, are gray.

The San Jose scale travels from state to state on young trees and shrubs and fruit. Infestation of Montana trees is not liable to occur from any of the scales that occur on fruit. Nursery stock is the one great source of danger. From tree to tree in the orchard and from orchard to adjoining orchards the insects are transported on the feet of birds and bodies of other insects.

Lime, sulphur and salt is found to be a very effective winter spray for this insect on the Pacific slope and undoubtedly would be as efficient in case of infestation in Montana. The best remedy, however, if but a few trees are infested is to destroy them by burning.

APPLE TREE ANTHRACNOSE.

By Prof. A. B. Cordley, 1900 Report Oregon Board of Horticulture.

Some Preliminary Notes.

These few notes are issued to call the attention of growers to a serious disease of apple trees; to indicate the nature of the disease and how it is propagated, and to suggest methods for its control.

The disease is new only in the sense that its cause has never before been described. For several years past the apple orchards of the Pacific Northwest, including Western Oregon, Washington and British Columbia, have suffered more or less seriously from the attacks of this disease which has been known locally as "canker," "dead spot," or "black spot." In fact the ravages of the disease have been so serious the past season that persons prominent in horticultural affairs have expressed the conviction that the apple growing industry of the above mentioned region is threatened with destruction. While not in any sense agreeing with this pessimistic view, we realize that the disease is a serious one, and several months ago undertook the problem of discovering its cause and, if possible, a satisfactory remedy for it. As a result of our work up to the present time the first problem has been solved and, we believe, we can offer a reasonably satisfactory solution of the second.

An Undescribed Disease.

Although of considerable importance the disease seems to have been almost entirely overlooked and nothing of importance concerning its nature has been published. Some months ago Mr. Paddock, of the New York Experiment Station, at Geneva, discovered that a fungus which causes the well known "black rot" of apples and quinces is also the cause of a disease of apple bark which he named "canker." At the time we were in hopes that Mr. Paddock's discoveries would explain the cause of our somewhat similar western disease, but only a cursory examination was needed to show that this is not the case; and recently I have had, with Mr. Paddock, the privilege of comparing the two diseases, with the result that we were both convinced that they are entirely distinct. Further study also convinced me that the disease is a new one and that it is caused by an undescribed species of fungus for which I have proposed the name *Gloeosporium malicorticis*.

Common Name of the Disease.

As stated above the disease has been known locally as "canker,"

"dead spot" and "black spot." Ordinarily it is best to accept a common name when once established in a locality, but in this particular instance we believe that confusion in the designation of the disease in future can best be prevented by adopting for it an entirely new name. The name "canker" is most commonly used in European works on plant diseases to designate injuries to the bark which are caused by various species of *Nectria*. In the Eastern United States it has been applied, by Mr. Paddock, to a disease of apple bark which is caused by a *Sphaeropsis*. To apply the same name to a disease which is caused by a fungus entirely different from either of these would only lead to confusion. "Dead spot" and "black spot," the two other names which are sometimes used, applied not only to the disease under consideration, but also to diseased areas which are due to various other agencies, such as sun-scald, the pear blight, bacillus, etc. In view of these facts and in order to avoid confusion, we shall propose for the disease the somewhat unwieldy name of "Apple-Tree Anthracnose." Although somewhat cumbersome the name seems appropriate from the fact that the fungus which causes it, *Gloesporium malicorticis*, is closely related to numerous other fungi of economic importance which have quite generally been designated as anthracnoses.

Nature of the Injury.

Apple tree anthracnose attacks principally the smaller branches—those under two or three inches in diameter—although it also occurs upon the larger ones and on the trunks of young trees. It appears first in fall, soon after the autumn rains begin, as small, irregular, sometimes slightly depressed, brown areas of the bark. During the fall and winter months it spreads slowly, but, with the advent of warmer weather in spring, growth takes place rapidly until, under favorable conditions, the disease may invade an area several inches in diameter. Such areas under observation at Corvallis the past season ceased to enlarge late in May, and early in June the first evidence of spore formation was noted. At that time the diseased areas were dark brown in color, markedly depressed, and in most instances limited by ragged, irregular fissures which separated the dead from the surrounding living tissues. These dead spots vary in size from those not more than one-half inch in diameter to extensive areas two or three inches wide by six or eight inches long. Occasionally a single area completely girdles a branch, thus killing at once its distal portion; but more commonly only a dead spot occurs, from which in the course of a few months the bark sloughs off, leaving an ugly wound which requires several

years to heal. When these wounds are at all numerous the branches are exceedingly rough and disfigured and are moreover greatly weakened.

Cause of the Disease.

Apple tree anthracnose is caused by a fungus which belongs to the genus *Gloeosporium*. It is therefore one of the imperfect fungi—so-called simply because the perfect form, if it has one, is not known. If a recently anthracnosed spot be examined carefully, it will be seen to be covered by minute projections. These are known as the acervuli and they contain the spores of the fungus. At Corvallis the past season they began to appear early in June. At first they were noted as small conical elevations of the epidermis, which were scattered irregularly over the diseased area. By the end of June these elevations had increased considerably in size and in a few instances the overlying epidermis had been ruptured so as to expose to view the cream-colored mass of spores, which, however, soon became dark colored. During July, August and September these acervuli became more and more abundant and by the beginning of October a very large proportion of them had burst open for the purpose of discharging their spores. Spores which were collected late in June were immature and could not be induced to germinate. Others which were gathered in July were also mostly immature, but in October I obtained an abundant supply of mature spores which germinated very readily. The mass of spores in each acervulus can be easily seen with the unaided eye, but the individual spores are so small that they can only be seen by the aid of a good microscope. They average about six by twenty-four microns and are single celled, hyaline or with a greenish tinge, elliptical, curved or geniculate and coarsely granular. Sections through a mature acervulus show, under the microscope, a sub-epidermal stroma from which arise comparatively long, closely compacted basidia, on the ends of which the spores are born. It is the growth of this underlying mass that finally ruptures the epidermis over it and thus sets free the spores.

How the Fungus Works.

As stated above, the spores mature, and the acervuli burst open to set them free in late summer and early fall. Thus exposed the spores are doubtless distributed by the rains and winds and possibly to some extent by birds, insects and other agencies. A vast majority of the spores thus distributed undoubtedly fall in uncongenial places and fail to develop; but occasionally one lodges in

a suitable place on the bark of some limb. We found in our work that such spores germinated readily at a temperature of 22 degrees c. (72 degrees F.), but that at a temperature of 29 degrees c. (84 F.) germination was indefinitely delayed. It therefore seems certain that the spores do not germinate during the summer, when the delicate germ tube would be killed by the extreme heat and by lack of moisture; but as we have seen that mature spores are present in immense quantities early in October, and probably considerably earlier, it is fair to assume that they start to germinate soon after the cool fall rains begin. Whether the mycelium of the germinating spores penetrates the cuticle of the apple bark or whether it gains access to the inner tissues through some slight crevice has not been determined as yet. However, after gaining access to the living tissues the mycelium ramifies through them, absorbing the nourishment upon which it grows and killing the surrounding cells. During the winter, as previously stated, the growth of the fungus and consequent spread of the disease is slow, but in the spring the mycelium takes on renewed activity, which is shown by the rapid spread of the disease. In May or early in June the fungus reaches the fruiting stage and from that time all its energies are devoted to the production of spores and the diseased areas cease to spread. Whether the mycelium, having accomplished the object of its existence, the accumulation of nourishment for the production of spores, then dies, or whether it merely enters a resting stage to be again stimulated to renewed activity by the fall rains, has as yet not been determined, although it has an important bearing upon the means to be employed in controlling the disease as will be shown later.

The Fungus the Cause of the Disease.

We have stated above that the disease is caused by the fungus *Gloesporium malicorticis*. It may be of interest to the orchardist to know upon what evidence we base the assertion. It is not necessary to give at this time all details of the work which have led us to the conclusion. In brief, however, spores were induced to grow in artificial cultures. As they germinated they were examined under the microscope, their positions carefully marked, and when they had developed to such an extent that they could be seen by the unaided eye, they were separated from all other growths and transferred to tube cultures. This process was repeated many times and in different ways to eliminate all sources of error. When convinced that no other living organism was present in the tube cultures, a number of sections of apple limb

were inoculated with this "pure culture" of the fungus. In about a week after these inoculations were made, slightly discolored areas were observed about several of the points of infection, and in three weeks these areas had developed all the characteristics of the disease as seen in nature; being brown, distinctly depressed and separated from the surrounding living portions by the irregular ragged fissures. Having thus succeeded in producing the disease by inoculating with the fungus, we are justified in asserting that the fungus is the cause of the disease.

Remedies.

Before any experiments in controlling the disease could be intelligently undertaken, it was necessary to know something of its nature. Having shown that it is caused by a certain fungus, the question of most interest is, can it be controlled? And, if so, how? My absence from the state, while studying the fungus itself, necessarily prevented me from conducting any experiments in controlling it, but from what I now know of the disease, I believe that I may safely assert that it can be controlled. We have seen that the spores are developed and probably distributed during the late summer and fall months, and that they undoubtedly germinate after the fall rains begin. It is also known that bordeaux mixture and other copper compounds prevent the germination of the spores of most fungi. We therefore infer that if the trees be properly sprayed with bordeaux mixture, or with the ammonical solution of copper carbonate, once soon after the fall rains begin and again as soon after the leaves fall as possible, the germination of the spores will be largely prevented and the spread of the disease be thereby checked. It is not expected that such a process will exterminate the disease, but it is believed that it will so reduce its ravages that it can no longer be considered a menace to the apple growing industry. For the latter of the two applications mentioned above, bordeaux mixture, winter strength, should be used. For the former, bordeaux mixture, summer strength, may also be used, but if the fruit is on the trees it would be better to use the ammonical solution of copper carbonate. Whichever spray is used should be thoroughly applied and applied as soon as possible after the fall rains begin. The fungus cannot be destroyed by sprays after it has once entered the tissues of its host.

In addition to the sprayings recommended, we should advise owners of young orchards, or orchards but little diseased, to carefully cut out and paint over with strong bordeaux all anthracnosed

spots that may be observed. As stated in a preceding paragraph, it is possible that the mycelium of the fungus in the dead area of bark, after resting through the summer, may be stimulated to renewed activity by the fall rains, and thus itself be an additional means of propagating the disease. Should this be the case, which we are at present inclined to doubt, spraying will not be entirely efficient in preventing the spread of the disease. For the present, at least, or until the above supposition can be proved or disproved, it will be advisable to supplement the sprayings by using the knife wherever practicable. Old, badly diseased orchards, can best be renovated by pruning severely and spraying thoroughly.

THE FLATHEAD APPLE TREE BORER—*Chrysobothris Femorata* Fab.)

From Bulletin 32, Second Series Dept. of Agriculture, Division of Entomology.

General Appearance and Nature of Injury.

A much less dangerous, though more abundant, insect than any of the preceding, is the flat-headed apple tree borer. It belongs to a different family of Coleoptera, the short-horned wood borers or metallic beetles of the family Buprestidae, and differs remarkably from the preceding in all its stages as well as in its habits and life history.

The adult insect measures from a little less to a little more than a half inch in length. It is flattened above, resembling somewhat a snapping beetle, but it is not provided with jumping organs like the Elateridae. The antennae are short and serrate, the eyes large and conspicuous, and the forelegs are armed in front with a conspicuous tooth. The upper surface of the body is dark metallic brown and fresh specimens are coated here and there with a powdery gray substance, which is easily rubbed off. The wings covers are ornamental and underneath, as may be seen when the insect is in flight, the body is a bright metallic greenish blue. The under surface is coppery bronze. The males are smaller and may further be distinguished from the females by their green heads as well as by other characters.

Unlike the round-headed borer the present species is diurnal in habit, being most active in the heat of the day and commonly found on prostrate trees and logs, or on injured trunks basking in the sunlight. The beetles are active creatures, running rapidly and flying readily.

This species attacks by preference diseased or dying trees, inhabits all parts of a tree from the base of the trunk to the limbs, and is not restricted in its ravages to fruit trees, but attacks also a variety of deciduous trees.

In all these respects it differs from the round-headed borer, but agrees with the latter in that it is injurious chiefly to young trees, its injuries being practically confined to newly transplanted nursery stock and to trees which have been weakened through any cause, such as careless pruning, or insufficient nourishment due to poor soil or drouth. There is a difference of opinion as to the nature of damage, some writers taking the stand that healthy trees are not injured at all. It is a well-known fact that many forms of boring insects prefer injured plants, but when this is wanting do not hesitate to attack perfectly sound growth, and records show conclusively that the present species is included in this category. The general opinion is that trees suffering from "sun scald" are most subject to attack and the opinion has been expressed that injury known under this name is in reality due to the work of this species of borer. The beetle is essentially a sun-loving species and deposits its eggs practically exclusively on the southern or southwestern sides of standing trees or on recently felled logs that are exposed to direct sunlight. Observation shows that it is doubtful if the young larvae would be able to withstand the strong flowing sap of vigorous trees.

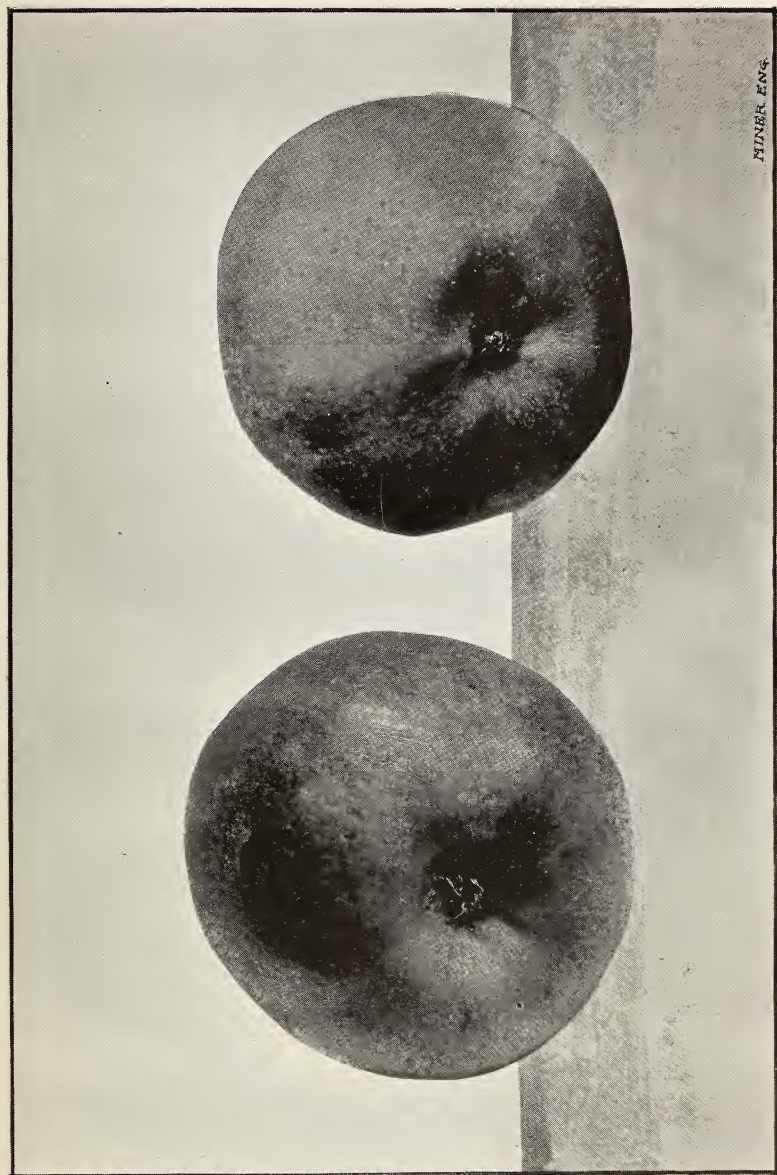
Infestation may be detected by the discoloration of the bark.

A list of its recorded food plants includes, among orchard trees, apple, pear, peach; and of shade and forest trees, mountain ash, oak, maple, box elder, hickory, chestnut, sycamore, horse-chestnut, linden and willow. To this list should be added plum and cultivated redbud (*Cercis japonica*), from which the species has been reared by the writer, and currant.*

Cherry, beech and white birch are probably food plants, although the beetle has not been reared from them, and elm, tulip and cottonwood have been mentioned as such, but on what authority is not clear. Oak is without doubt the natural host tree.

The larvae differs greatly from that of the round-headed borer. Its name of flat-headed borer is derived from the peculiar flat expansion of the second thoracic segment, the one just behind the head. In color it is a light yellow, and in length it measures

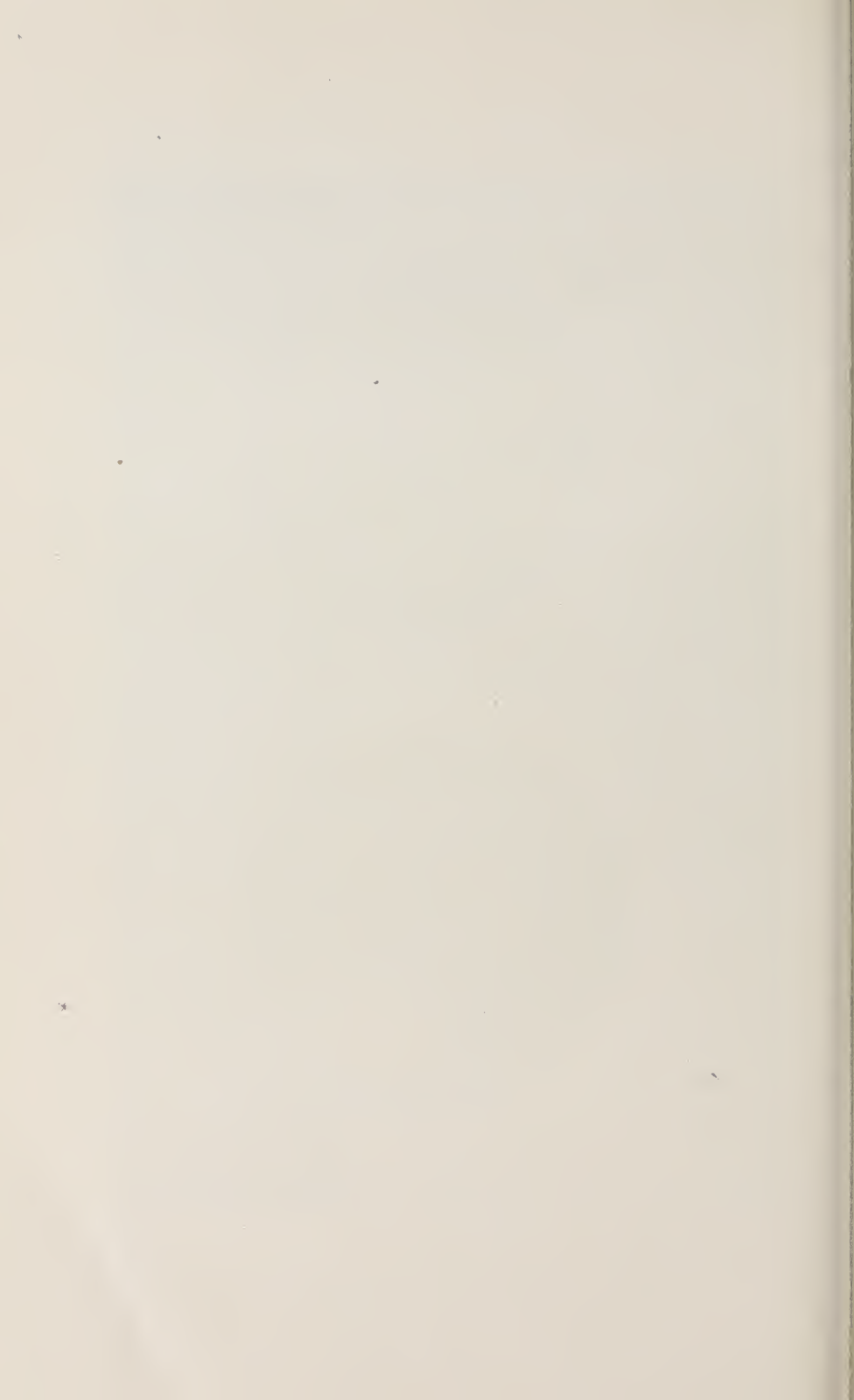
* F. H. Hillman, Nevada Experiment Station, Bull. 36, p. 13.



MYNER ENG.

STAMEN WINESAP. Medium size, good flavor, color red.
Late keeper.

BALTIMORE. A good looker, but no description given
with specimens.

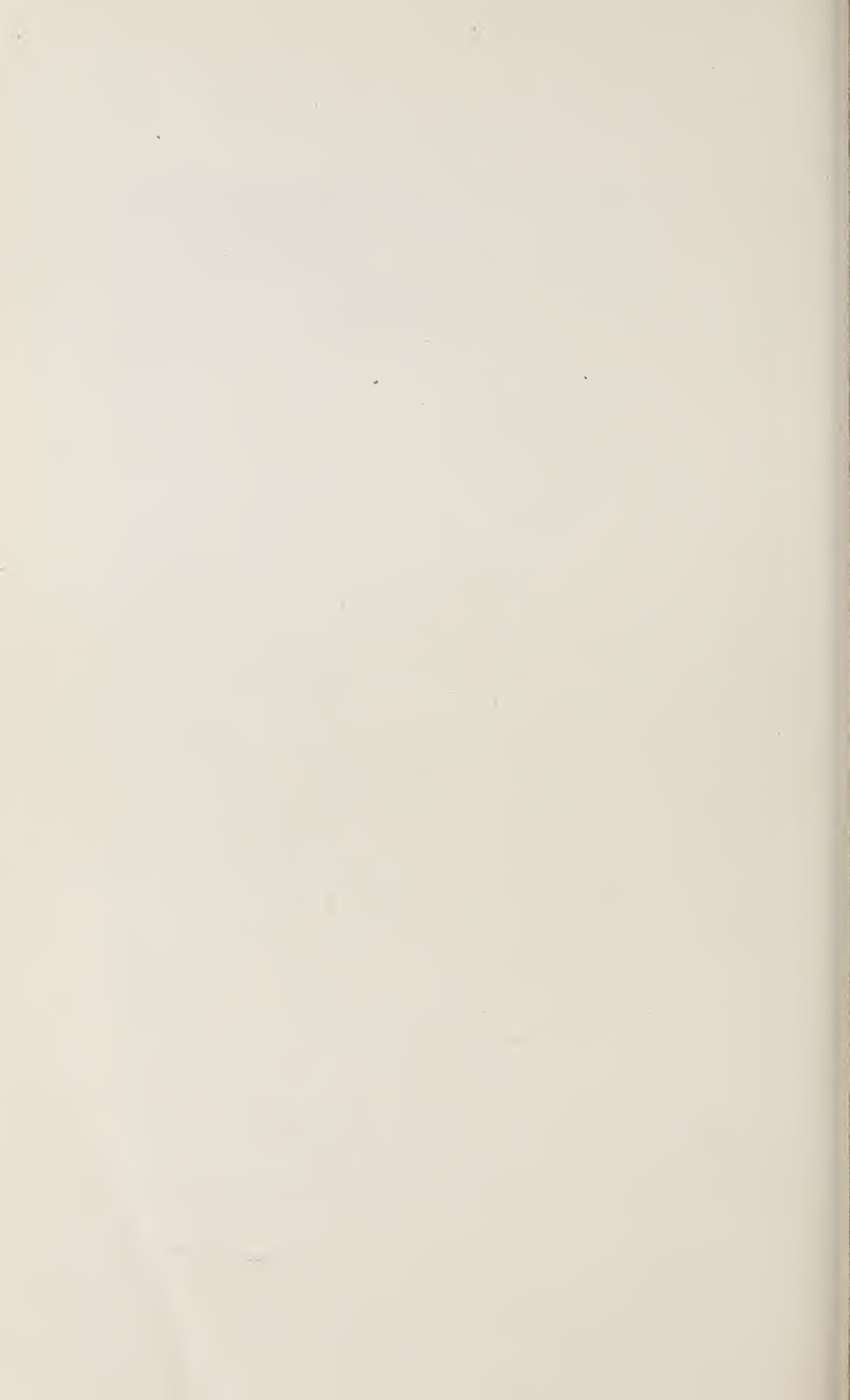




MINER ENG.

COPPERT. Medium size, heavy yielder, tree hardy, flavor good, color poor. April.

JONATHAN. Medium, color red, good flavor. Late keeper.



nearly twice that of the mature insect. It habitually rests in a curved position. The pupa shows the form of the future beetle and is of the same yellow color as the larvae.

This species inhabits practically the entire United States and the southern portion of Canada, being like the preceding, a native of North America and injurious year after year.

Natural History and Habits.

The beetles made their appearance about the same time as the round-headed borer in regions infested by both species, in the principal apple growing regions of the northern states after the middle of May, and continue through the month of July, and, it is said, even into September, the female depositing her eggs upon the trunks or branches of trees destined to be the future food of the larva, in cracks and grooves or under bark scales. Several eggs are most frequently found together. The eggs are yellow in color, irregularly ribbed and about one-fiftieth of an inch in length.** The larva differs from the round-headed borer in that it requires only a single year for its development, pupation occurring in the spring shortly after the appearance of the beetles. It differs also in its manner of work, living for the most part just beneath the bark, where it excavates broad, flat and very irregular channels, but sometimes entering more deeply into the sap-wood. Like many other borers it often girdles a small tree, a single individual being capable of killing a small tree in this manner. As it approaches maturity it generally eats deeper into the solid heart-wood, but in springtime, just before transformation, it works back again into the bark and there constructs its pupal chamber. In the pupa state it is said to remain about three weeks, when the beetle enters the bark and there constructs its pupal chamber. In the pupa state it is said to remain for about three weeks, when the beetle cuts its way out, leaving an elliptical exit hole in the bark, which distinguishes its work from that of the round-headed borers, which make round holes in their exit, these holes corresponding to a cross-section of the beetle which makes them. In the north the winter months are passed as larvae, but further south, in the District of Columbia, according to recent observations, pupation may take place as early as November the first year.

Natural Enemies.

Among natural enemies, woodpeckers are effective destroyers of this species, as are also ants, which devour larvae and pupae

** C. V. Riley, Proc. Ent. Soc. Wash., Vol. III, p. 92.

under the bark. A number of parasitic insects also prey upon it and assist greatly in restricting its too great abundance.

Remedies.

The remedies advised for the round-headed borer are also of value and are generally employed against the present species. It is necessary, however, that deterrent coverings and washes should be applied farther up the trunk and to as many branches as can be conveniently reached. As this, however, necessitates additional labor and extra expense, other preventive measures are recommended.

Trap wood for beetles—For this purpose any sort of tree known to be freely attacked by this borer, e. g., oak, maple or any fruit tree may be used. If a few limbs or trunks of newly felled trees be placed at intervals, say thirty or forty feet, on the outskirts, of orchards, where they would be freely exposed to the sun, the beetles would be attracted for the deposition of their eggs, and all that would then be necessary would be to destroy the trap wood by burning before April or May of the following year. This plan has not been practically tested, but the writer has no doubt that it would prove useful in securing immunity from this pest in the orchard, provided that no diseased fruit trees be left for food.

Cultural carefulness—Careful, clean methods of cultivation are essential as a measure of protection and involve the cutting out of dead, dying and injured deciduous forest and shade trees known to be chosen as food by this beetle, as well as orchard trees. Care should be exercised in transplanting, and especially in pruning, and the use of fertilizers should not be neglected, that the trees may be thrifty and better able to withstand attack. Proper regard for these measures should give practical exemption from injury.

OYSTER SHELL SCALE—(*Mytilaspis Pomorum*, Bouche).

By Prof. Alexander Crow, Oregon State Board of Horticulture,
1900.

This scale is very damaging to apple trees and also infests other plants. The scale of the female is mussel shape, more or less curved, of a purplish-brown color, with the exuviae yellowish. Length, one-sixteenth of an inch. The body of the female is light yellow. The last segment presents the following characteristics: The anterior group of spinnerets consists of from eleven to seventeen; the anterior laterals and posterior laterals each of sixteen to twenty-one. The median lobes are large and wide, with the sides parallel; they are only about three-fourths as long as broad. Each lobe is narrowed on each side near the distal extremity by one or two notches, and then rounded. The second lobe of each side is about as wide as the first and is deeply incised; mesal lobule with mesal margin as long as lateral margin of the first lobe and rounded posteriorly; lateral lobule about half the length and width of mesal lobule and similar in shape. Third lobule obsolete. The plates are long, simple and tapering.

Eggs—These are white and are arranged irregularly under the scale.

Scale of male—The scale of the male of this species is usually straight and of the same color as that of the female. At about one quarter of the length of the scale from the posterior extremity the scale is thin, forming a hinge which allows the posterior part of it to be lifted by the male as he emerges. Length, six hundredths of an inch. The male is translucent, corneous gray, with a dorsal transverse band on each joint, and the portions of the mesothorax and metathorax darker, or purple gray, with the members somewhat lighter.

According to climate and locality the young scale hatch from the middle of March to June. Color, yellow. They begin to form the cottony excretion after twenty-four hours and in two to four days the insect is completely covered with a dense excretion, which increases as the larvae grows.

In several of the older apple growing districts of the state this scale has secured a lodgment, and in neglected orchards that have been subdivided into city lots they have made considerable progress.

THE PEAR LEAF MITE.

By Prof. F. L. Washburn, Report Oregon State Board of Horticulture, 1900.

The affection of the pear leaf is caused by a minute mite, *Phytoptus pyri*, and is probably more common and has been here longer than most orchardists realize; in fact, it is very likely that much of that which has been called "blight" on the pear by casual observers, is really the work of this pest. The mite is very small and hardly visible to the naked eye.

It attacks both sides of the leaf, but individuals are more numerous on the under side, where the small "blisters" can be seen with the naked eye. A lens, however, is required to show the opening in the center of the blister which serves as a doorway for the mite. The location of the injury below is made apparent on the upper surface of the leaf, by an irregular reddish spot (in the early stages) which changes later to brown and black, while the tissue of the leaf between these two points, in which tissue eggs and young mites are found, becomes corky and dies.

The injury to the tree is more readily seen in the middle and late summer, when, in bad cases, almost its entire foliage looks blighted.

The young mites when hatched spread from leaf to leaf, creating new blisters and thus bringing about the condition referred to above. In the autumn, when leaves begin to wither and fall, the mites migrate to the twigs and hibernate beneath scales of bark or bud in the minute crevices on twigs, and in the spring they are fully open. It is hardly necessary to say that this mite saps the vitality of the tree and interferes with the natural functions of the leaves.

When a tree is observed to be first attacked pick off and burn the infected leaves. Heavy pruning and burning the cuttings of such trees as are badly affected, during the winter, will probably be more efficacious than anything else. One or two sprayings of kerosene emulsion in the autumn when mites are migrating would destroy many. The same spray, used several times, has been recommended for winter use. It is highly spoken of in a Cornell University bulletin and is to be used in this proportion: One part emulsion to seven or eight parts of water.

P. S.—The best remedy for Oregon is sulphur, lime and salt before the buds swell, followed by dusting with sulphur when leaves have formed.—Henry E. Dosch.

THE WOOLY APHIS OF THE APPLE—(*Schizoneura lanigera*, Hausmann.)

By Prof. C. L. Marlatt.

General Appearance and Method of Work.

Throughout the summer on the lower portion of the trunk and particularly on the water sprouts of the apple may often be seen small bluish-white flocculent or cottony patches, which indicate the presence of colonies of one of the worst enemies of the apple, viz.: the insect variously known in this country as the "apple root plant louse," "wooly apple louse," "wooly aphis," etc., and abroad very generally as the "American blight." It exists in two forms, the one just referred to, above ground on the trunk or water shoots, and another inhabiting the roots and not open to observation. Closely paralleling in these particulars the grape phylloxera, the damage from the wooly aphis is also almost altogether due to the root form, the aerial colonies causing scarcely any injury. On the roots its attacks induce enlargements or galls or swellings very similar to those produced by the phylloxera, and in the cracks of these galls or swellings the root form occurs in clustered masses. The injury to the trees is due both to the sucking up and exhaustion of the vital plant juices and to the poisoning of the parts attacked, as indicated by the consequent abnormal growths.

The damage is particularly serious in the case of nursery stock and young trees and less often important after the tree has once become well established and of some size. Where this insect is abundant all the roots of a young tree to the depth of a foot or so become clubbed and knotted by the growth of hard fibrous enlargements, with the result in a year or two of the dying of the rootlets and their ultimate decomposition with attendant disappearance of the galls and also of the lice, so that after this stage is reached the cause of the injury is often obscure. On the trunks the presence of the lice sometimes results in the roughening of the bark or a granulated condition which is particularly noticeable about the collar and at the forks of branches or on the fresh growth around the scars caused by pruning, which latter is a favorite location. On the water shoots they collect particularly in the axils of the leaves, often eventually causing them to fall, and on the tender greener sides of the stems. The damage above ground, though commonly insignificant, is useful as an indication of the probable existence of the life on the roots. A badly attacked tree assumes a sickly appearance and does not make sat-

factory growth and the leaves become dull and yellowish, and even if not killed outright it is so weakened that it becomes especially subject to the attacks of borers and other insect enemies. Injuries from the wooly aphid are almost altogether confined to the apple, even the wild crab not being so liable to attack or at least injury by it. There is, however, some difference exhibited by different varieties of apple in immunity, and particularly is the Northern Spy proof against it, and it is possible that, as in the case of the grape phylloxera, by employing root stock from seedlings of the more resistant varieties, or from wild crabs, considerable protection would result. The character of the soil also exerts some influence, that is, loose dry soils are favorable and wet compact ones are unfavorable to the aphid.

Origin and Distribution.

There is considerable difference of opinion as to the origin of the wooly louse of the apple. The belief has fluctuated between a European and an American origin for this insect, but the weight of evidence seems to indicate the latter. At any rate, it is an insect which is most readily carried from place to place with nursery stock of the apple, and it has been so transported to practically all the important countries of the world which have been reached by colonization or European settlement. The wooly aphid was first noticed in England in 1787, on some stock imported that year from America, and was early called the American blight. Hausmann described it in 1801 as infesting apple trees in Germany, and within the next twenty-five years it was recognized as a serious enemy of this fruit tree throughout England, Belgium, North France and Germany, but seems never to have been especially notable in the warmer latitudes of Europe.

It was very early introduced into Australia and New Zealand, and is known in India and Chile, and probably is as widespread as any of the common injurious fruit pests. Notwithstanding the possibility of its being a native American insect, it did not attract attention in this country much before 1850. Its spread since has, however, been rapid, and it now occurs practically wherever the apple is grown. It has been reported to this division from no less than thirty-five states and territories and nearly one hundred localities. It is particularly abundant and injurious in the latitude of the Ohio valley. While seemingly, therefore, somewhat affected by severe cold, it is able to thrive in the climate of the northern tier of states on the one hand and in that of Louisiana, New Mexico and Southern California on the other.

Natural History and Habits.

In common with most plant lice, this species has a complicated life history, some of the details of which are still lacking. The common forms both on the roots and above ground are wingless lice, not exceeding one-tenth of an inch in length, and of a reddish-brown color and abundantly covered, especially in the aerial form, with a flocculent waxy excretion. These are so-called agamic females and reproduce themselves by giving birth, as observed by many entomologists, to living young indefinitely, perhaps for years, without the intervention of other forms. The newly born larvae have none of the white excretion, which, however, soon appears as a minute down when they begin to feed. These lice are also peculiar in lacking the honey tubes common to most aphides, but exude the honeydew from the tip of the body. In October or November, or earlier in the south, among the wingless ones, numbers of winged individuals appear, which are also all females, and are the parents, as shown by the observations, partly unpublished, of Messrs. Howard and Pergande, of a true sexed generation of minute, wingless larviform lice, the females of which, as in the case of the grape root louse, give birth to a single "winter egg." This egg is attached within a crevice of the bark and, probably, following the analogy of the phylloxera, hatches in the spring into a female aphid which originates a new aerial colony.

The winged females appear somewhat abundantly in autumn, and are one of the means of the dispersal of the insect. They are very minute, clear-winged, gnat-like objects, greenish-brown, almost black in color, with the body covered with more or less of the cottony excretion.

The aerial colonies are probably killed out every winter in the colder northern districts, but in the warmer latitudes the partly-grown individuals, at least, survive protected in crevices or under bits of bark, and remain more or less active during the winter and renew the colonies the following spring. This has been shown to be true in the District of Columbia and also in the interior regions of the same latitude in spite of the much colder winters. The root form survives the winter usually in an immature condition, namely, larvae in various stages of development, and both in latitudes where the aerial forms are killed by the severity of the winter and elsewhere it seems probable that there is a regular upward migration in spring and early summer from the roots, the aerial colonies appearing first near the crown and at a later period

on the higher parts of the trees. At any time during the summer and fall there may be migrations to the roots and throughout the year the subterranean colonies are maintained.

The spread of the insect is accomplished in part by the viviparous females, which appear in late summer, but quite as commonly perhaps by the transporting of young or partly grown individuals from tree to tree or to distant orchards by means of birds or insects to which they have attached themselves. Its wide distribution is usually dependent on the traffic in nursery stock.

Remedies and Preventives.

The foregoing account of the habits and characteristics of the wooly aphid will enable us to suggest certain measures to control it. The aerial form presents no especial difficulty, and can be very readily exterminated by the use of any of the washes recommended for plant lice, such as kerosene emulsion, a strong soap wash, resin wash, etc., the only care necessary being to see that the wash is put on with sufficient force and thoroughness to penetrate the covering and protecting cottony excretion. If the wash be applied warm, its penetration will be considerably increased.

The much more important root form, however, is more difficult to reach and exterminate. Any of the remedies which are applicable to the phylloxera will apply to the apple root plant louse, such as the use of bisulphide of carbon or submersion. The common recommendations are of applications of strong soap or tobacco washes to the soil about the crown, or soot, ashes, or tobacco dust buried about the roots; also similarly employed are lime and gas lime.

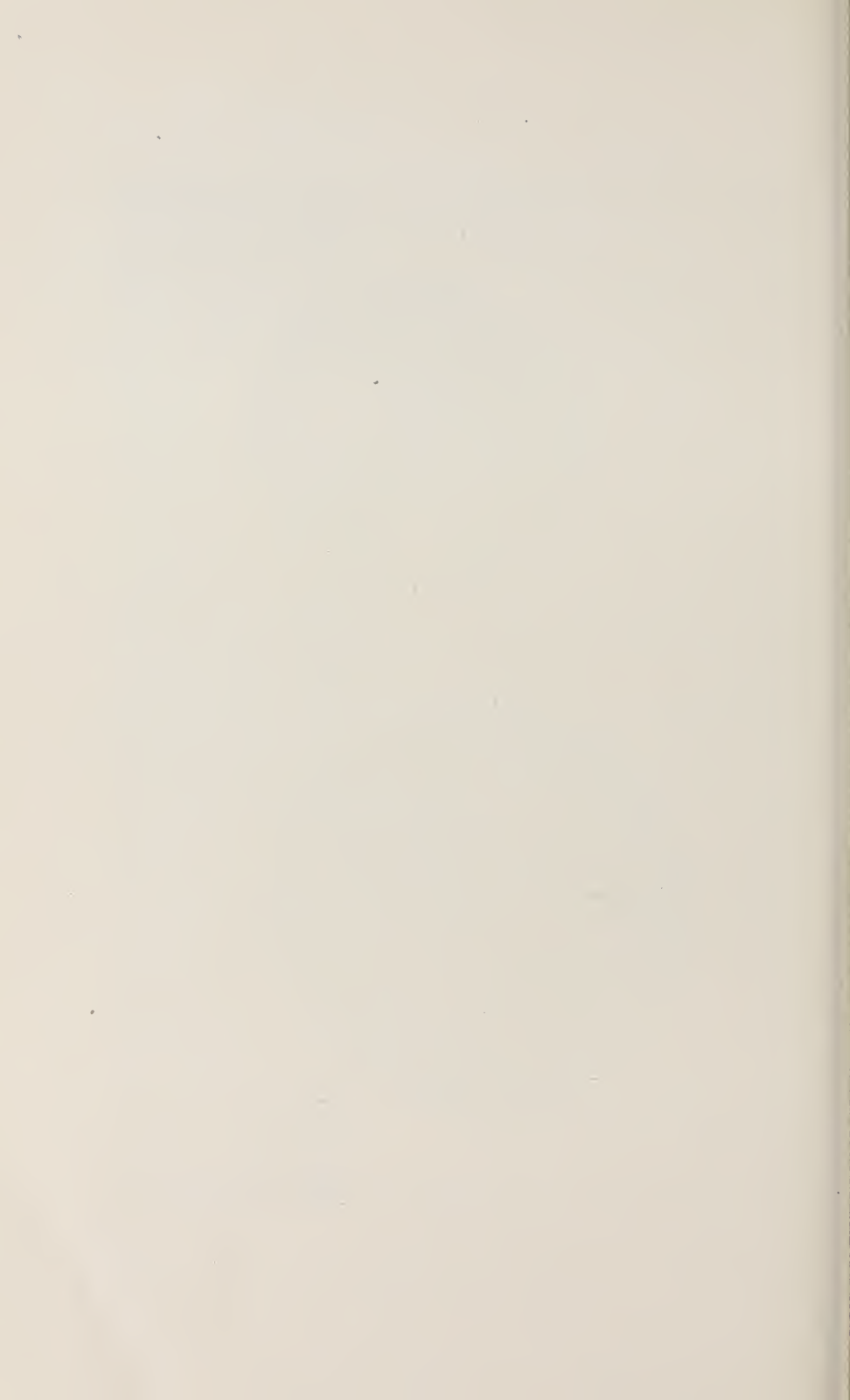
The most generally recommended measure hitherto is the use of hot water, and this, while being both simple and inexpensive, is thoroughly effective, as has been demonstrated by practical experience. Water at nearly the boiling point may be applied about the base of young trees without the slightest danger of injury to the trees, and should be used in sufficient quantity to thoroughly wet the soil to a depth of several inches, as the lice may penetrate nearly a foot below the surface. To facilitate the wetting of the roots and the extermination of the lice, as much of the surface soil as possible should be first removed.

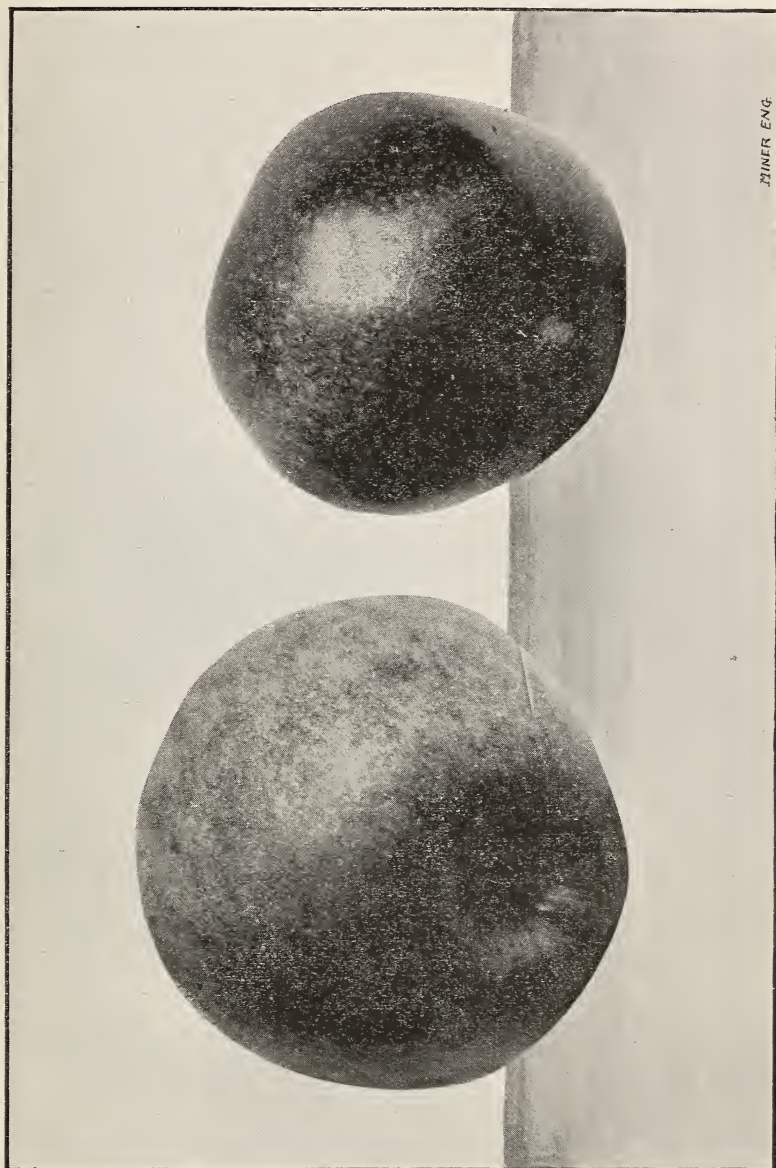
Some recent very successful experiments conducted by Mr. J. M. Stedman have demonstrated the very satisfactory protective as well as remedial value of finely ground tobacco dust. The desirability of excluding the aphid altogether from nursery stock is at once apparent, and this Mr. Stedman has shown to be possible by



YORK IMPERIAL. Medium to large, heavy yielder, flavor fair,
April to June.

ANTONOVKA. December to February.

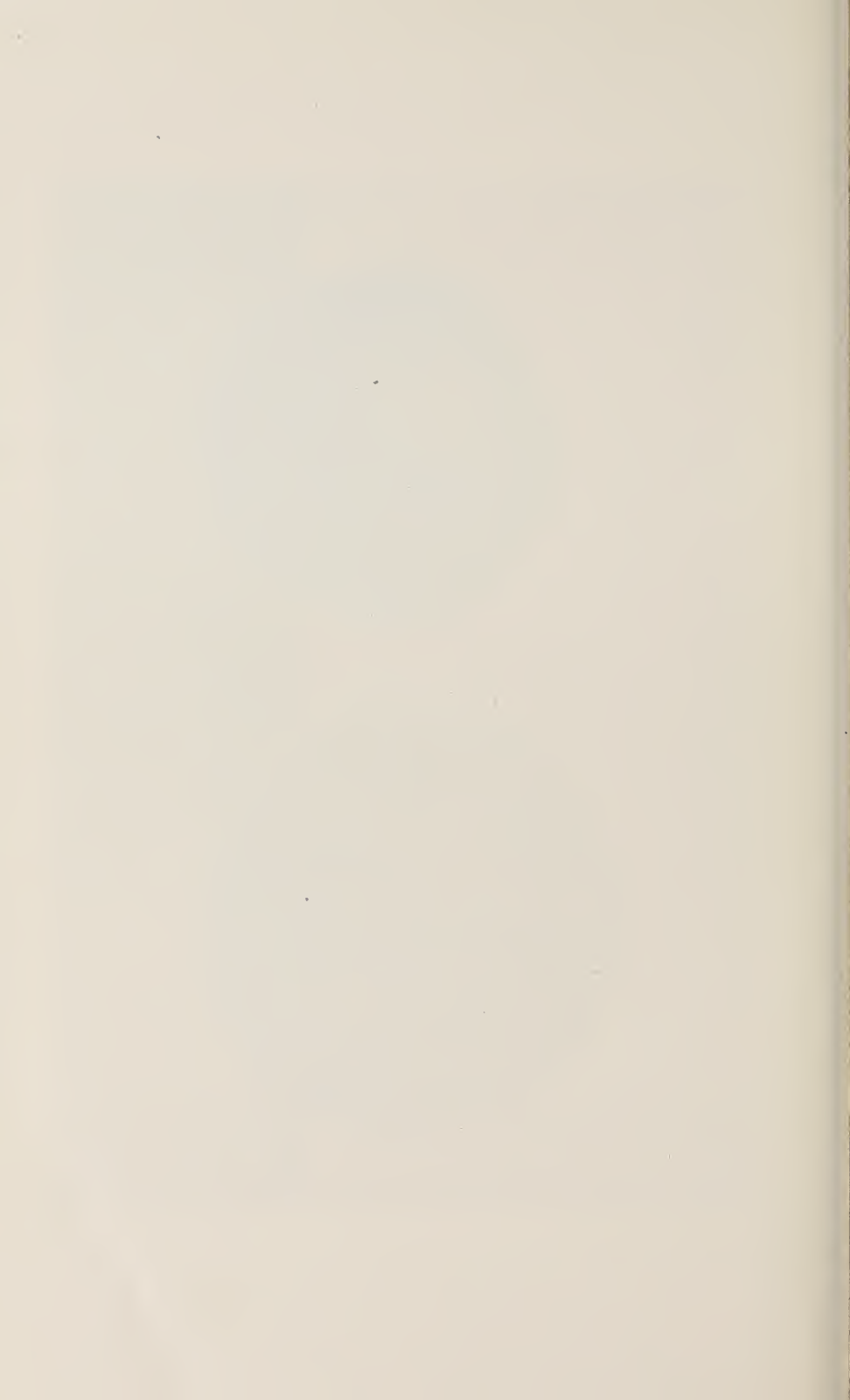




ZINER ENG.

BEN DAVIS. Large, good yielder, good color, hardy,
poor flavor. April and May.

BLUE PERMAIN. Large, dark red. Late keeper.



placing tobacco dust freely in the trenches in which the seedlings or grafts are planted and in the orchard excavations for young trees. Nursery stock may be continuously protected by laying each spring a line of the dust in a small furrow on either side of the row and as close as possible to the tree, covering loosely with earth. For large trees, both for protection and the destruction of existing aphides, from two to five pounds of the dust should be distributed from the crown outward to a distance of two feet, first removing the surface soil to a depth of from four to six inches. The tobacco kills the aphides by leaching through the soil and acts as a bar for a year or so to reinfestation. The dust is a waste product of tobacco factories and costs about one cent per pound, and possesses the additional value of being worth fully its cost as a fertilizer.

The use of bisulphide of carbon for the wooly aphid is the same as for the grape root louse. It should be applied in two or three holes about the tree to a depth of six to twelve inches and not closer than one and one-half feet to the crown. An ounce of the chemical should be introduced into each hole, which should be immediately closed. The bisulphide evaporates and penetrates throughout the soil and readily and promptly kills the aphides. It does not, however, furnish any protection from future attacks, and it is attended with danger to the tree unless the precautions named are carefully observed. That it is highly inflammable should also be constantly borne in mind. If it is to be used at all extensively, an automatic injecting device should be secured, such as the McGowan injector. The chemical costs ten cents per pound in fifty pound cans of the manufacturer, E. R. Taylor, Cleveland, Ohio.

Badly infested nursery stock should be destroyed, since it would be worth little even with the aphides removed. Slightly infested stock can easily be freed of the aphides at the time of its removal from the nursery rows. The soil should be dislodged and the roots pruned, and in batches of a dozen or so the roots and lower portion of the trunk should be immersed for a few seconds in water kept at a temperature of 130 to 150 degrees F. A strong soap solution similarly heated or a fifteen times diluted kerosene oil emulsion will give somewhat greater penetration and be more effective, although the water alone at the temperature named should destroy the lice. This treatment is so simple and inexpensive that it should always be insisted upon by the purchaser if

there be any indication of the presence of this insect, and stock exhibiting much damage should be refused altogether.

After planting, if the trees be kept in vigorous growing condition by careful cultivation and, if necessary, proper fertilizing, damage from the lice is much less apt to occur, and the principal danger period, namely, the first two or three years after planting in the orchard will pass in safety. The value, as a means of protection, of thorough cultivation and good care of young orchards can not be too strongly insisted upon. Vigorous growing trees have a decided power of resistance or are able to sustain with comparatively little damage the presence of the root louse, while ill-cultivated and neglected orchards are especially liable to injury.

The wooly aphid is subject to the attacks of a number of natural enemies, including the parasitic chalcid fly (*Aphelinus mali*, Haldermann), and the larvae of a syrphid fly (*Pipiza radicum*, Walsh and Riley), and also the larvae and adult of several species of ladybirds, the larvae of lice-wing flies and spiders, etc. In the east a very small brown species of ladybird (*Scymnus cervicalis* Muls.) is often present in some numbers, and the common nine-spotted ladybird (*Coccinella 9-notata*), is also an active enemy of the wooly aphid. The nine-spotted ladybird has been used very successfully in California, on the authority of Mr. Ellwood Cooper, to rid trees of root lice, which was effected by colonizing the larvae of the ladybird at the base of the infested tree. All the parasites mentioned do much to keep the root lice in check, and in the case of old well-established trees are in most instances a sufficient protection, but in the case of young trees and nursery stock, where the damage from the louse is much more rapid and serious, the use of the direct remedies outlined should not be neglected, and particularly should the nursery treatment be insisted upon.

THE CLOVER MITE.—(*Bryobia Pratensis* Garman.)

By Prof. C. L. Marlatt.

Characteristics and Methods of Work.

The subject of this circular is a reddish-brown mite about twice the size of the ordinary red mite affecting greenhouse plants. It is nearly three-tenths of an inch in length, oval and with remarkably long anterior legs.

This mite first came into prominence as a disagreeable invader of dwelling houses about ten years since, but it had been known for a number of years earlier as an enemy of various fruit and shade trees and foliage plants, its occurrence on clover, particularly in the middle states, being indicated in its scientific name, *pratensis*, and its common name of clover mite. It belongs to the family of vegetable-feeding mites, *Tetranychidae*, which includes such well known depredators as the red spider of greenhouses, already referred to, and the six-spotted mite, which is quite troublesome to oranges in Florida. In California, where this plant mite is especially michievous, it has been very generally confounded with the red spider, and in probably most of the references to injury to deciduous trees on the Pacific coast by the "red spider" the real culprit is the insect under discussion.

The presence of this mite on foliage, either of clover or trees, causes the leaves to yellow or assume a sickly appearance, as if attacked by fungus. On the tender leaves of clover, notably on the upper sides, the juices are extracted, often over irregular, winding areas, imitating in appearance the burrows of certain leaf-mining larvae. The most notable indication, however, of the presence of the mite is the occurrence of the eggs, massed often in such numbers as to completely cover the bark at the crotches and branches and sometimes over the entire surface of the trunk. These eggs are of rather large size and of a reddish color, and are conspicuous objects and when numerous the decided color they impart to the bark leads to their ready discovery.

As out-of-door enemies they are injurious at times to clover and other grasses, including the true grasses, as bluestem, but it is to fruit trees that their injuries are especially marked. Throughout the Pacific coast and in the fruit districts of Colorado and other western mountain states the clover mite is one of the principal enemies of such deciduous fruits as peach, prune, plum, apple, pear, almond, cherry, etc., and the poplar and elm, black locust, arbor vine, etc., among shade trees. As house pests they

are troublesome from their presence merely in their efforts in the fall to find safe hibernating quarters and occasionally in their spring migrations in search of suitable breeding grounds.

Origin and Distribution.

Attention was first drawn to this mite in 1879, at Washington, D. C., from its occurrence on the trees in the department grounds and also on clover on lawns. It has since been reported from numerous localities, from Massachusetts to California. Northward it occurs in the east in northern New York and Canada. East of the Mississippi it has not been reported in the southern tier of states, the southernmost records occurring in Tennessee and North Carolina.

On the Pacific coast it is known from San Diego, in California, to East Sound, in Washington; and at Las Cruces, New Mexico, it is a serious fruit pest. In the Sierra Nevada mountains in California and in the Rocky mountains in Montana it has been found at elevations of from seven thousand to eight thousand feet.

It is remarkable, therefore, for its ability to exist under marked differences of temperature and elevation. Its wide distribution and its occurrence in situations remote from settlement indicate that it is a native species. It was first characterized scientifically by H. Garman in 1885, who proposed for it the common and Latin name by which it is now known.

Habits and Life History.

The wide range of this insect and the different climatic conditions under which it exists lead, as might be expected, to certain variations in its life history and habits in different localities. In the more northern regions of its occurrence and in the higher elevations it winters in the egg state, the last brood, if it may be so called, maturing in the fall, and depositing eggs on branches and trunks of trees, sometimes in sufficient numbers to entirely cover the bark two or three layers deep. In 1889 we received a mass of these eggs several layers deep on a piece of bark which the sender states was from an area of at least fifty square feet of eggs on the south side of trunks of cottonwoods growing at an elevation of from six thousand to eight thousand feet. This was in the Sierra Nevada mountains, Tuolumne county, California, and we have had a similar account with specimens from McCarthy mountain, in Montana, at about the same elevation. In the middle and eastern states, where the eggs are frequently found on

fruit trees, they are usually confined to the crotches and branches and are not nearly so abundant.

In the colder regions, where the winter is passed in the egg state, the issuance of the young mites the following spring varies from May until the middle of June, depending on the character of the season. In the warmer regions—as, for instance, in the latitude of Washington—the mites begin to be noticeable on foliage and grass in May or earlier, and enter their hibernating quarters early in October in crevices of fences or walls or under the loose bark of various trees. It is seen, therefore, that in the warmer localities breeding is hardly interrupted during the winter months and the winter is passed quite as much in the active as in the egg state. Throughout the summer young are produced continuously, as with most other plant mites, with no particular differentiation of broods.

The habit of this mite of abandoning its feeding situations in the fall to seek hibernating quarters elsewhere leads to its being a house pest of no mean importance. This is particularly true wherever it has been breeding on clover or other grasses near dwellings. From such situations, particularly in the Mississippi Valley States, it often swarms into dwellings through doors or windows, its small size enabling it to penetrate wire screens with ease to the very considerable disquietude of the housekeeper. There are only a few records of their entering houses in the east, and in the extreme west they seem only to have been found on trees.

Remedies and Preventives.

The protection of fruit trees from the attacks of this mite is comparatively easy where the winter is chiefly passed in the egg state, as in Colorado or other elevated or cold districts. The experience of Mr. C. P. Gillette in Colorado has shown that the eggs may be very easily destroyed during winter by applying kerosene emulsion of the trees at about twice the ordinary strength, viz: diluted with five parts of water. Spraying at this time is both economical and easy, on account of the absence of foliage, and no danger will result to the plants from the application. Such an application also in the warmer latitudes will be of almost equal value as a protection to fruit trees, since it will reach what eggs there may be and also many of the mites secreted in the cracks of the bark.

It is a much more difficult matter to protect clover and other grasses from the mites, except as it may be possible to spray in

winter the trees, fences, etc., on or in which the mites may be hibernating, in the vicinity of lawns.

Their entrance into houses in fall may be prevented by spraying the lower portion of the building, walls, etc., with pure kerosene as often as need be and also spraying the lawns immediately about the building with kerosene emulsion nine times diluted. The mites may be destroyed after they have gained entrance to the house by the free use of buhach or pyrethrum powder, burning brimstone or spraying with benzine, taking due precautions with the latter substance in the matter of fire.

Insecticides and Fungicides.

Insecticides may be divided into three classes according to the character of pests against which they are designed to be used. First, poisons that kill sucking insects. Second, poisons that kill leaf-eating insects. Third, poisons that kill fungi.

Sucking insects insert their beaks into the tissues of leaf or bark and suck the plant juices. A spray must be applied to the surface of plants and the poison remains on the surface as the water dries. The beak of a sucking insect goes through this and through the outer layers of the plant. No amount of stomach poisons can therefore injure them. Such insects are scale insects and plant lice. Never use arsenicals like paris green against these insects.

For sucking insects of this type a contact poison must be used. Kerosene oil, whale oil soap and quassia chips are poisons of this character. They operate by closing the breathing apparatus or by penetrating the skin.

Arsenicals are used where the injurious insect is leaf-eating or leaf-chewing. The potato beetle, codling moth or tent caterpillars are instances.

Paris Green.

Arsenic uncombined is injurious to foliage and in paris green it is combined with copper. Even in properly made paris green there is a small percentage of uncombined arsenic and this often burns foliage if applied in strong or even in weak solutions. To obviate this a little freshly slacked lime is added to the paste of paris green before the full quota of water is added.

Paris Green Formula—Paris green, one pound; freshly slacked lime, one pound; water, one hundred and twenty-five gallons.

Make a paste of the paris green with a little water. Add lime to the paste, mix thoroughly and pour in required amount of water. The mixture must be agitated while in use as paris green is but slightly soluble in water and the small granules sink readily to the bottom of the vessel.

Arsenite of Lead.

This substance is formed from the union of arsenate of soda and acetate of lead. It may be obtained from William H. Swift, of Boston, Mass., and sells from 15 to 18 cents per pound. Against the Gypsy moth in Massachusetts paris green was found to be not effective and experiments to find a better substance resulted in the discovery of arsenite of lead. Arsenite of lead does not

burn foliage even when used strong. No lime is required in its use. It is perfectly soluble in water, more effective than paris green and altogether an ideal arsenical poison.

"Disparene," manufactured by the Bowker Chemical Co., of Boston, Mass., is practically the same as arsenite of lead, but contains glucose and is slightly more adhesive.

Arsenite of lead, one pound; water, fifty gallons.

Arsenite of Lime.

This has the threefold advantage of being cheap, the amount of arsenic is under perfect control and it does not burn foliage. It is made by boiling for one hour.

White arsenic, one pound; fresh stone lime, two pounds; water, one gallon.

This may be kept in a tight vessel marked "Poison" and used as desired. For most insects one quart of the above will be sufficient. It is soluble in water and will not injure foliage at this strength. The cheapest arsenite and as effective as any.

London Purple.

Is cheaper than paris green and much used, especially for the potato beetle, as the foliage of the potato is not easily burned. Contains more soluble arsenic and should have more lime added. Otherwise used in the same proportions as paris green. In every way but price it is inferior to paris green and should never be used on delicate foliage.

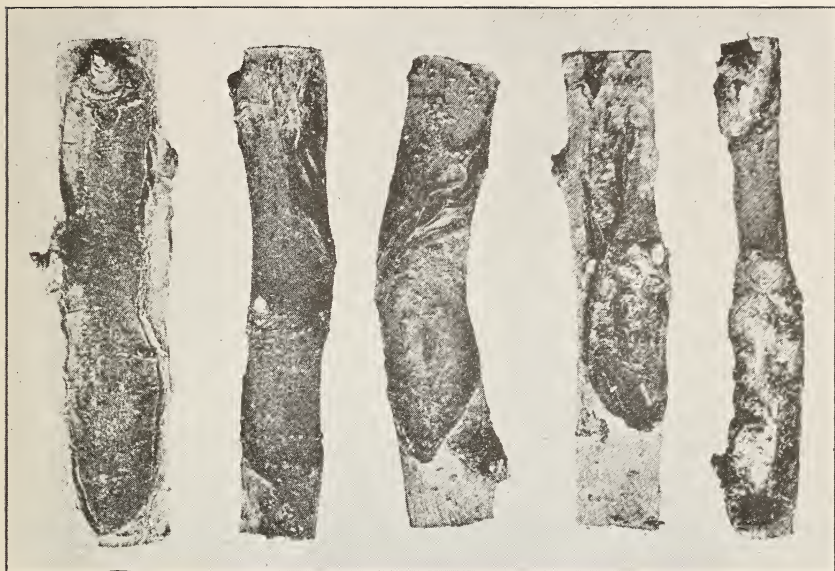
Contact Insecticides (for Sucking Insects).

Kerosene Emulsion—Hard soap, one half pound; boiling water, one gallon, kerosene, two gallons.

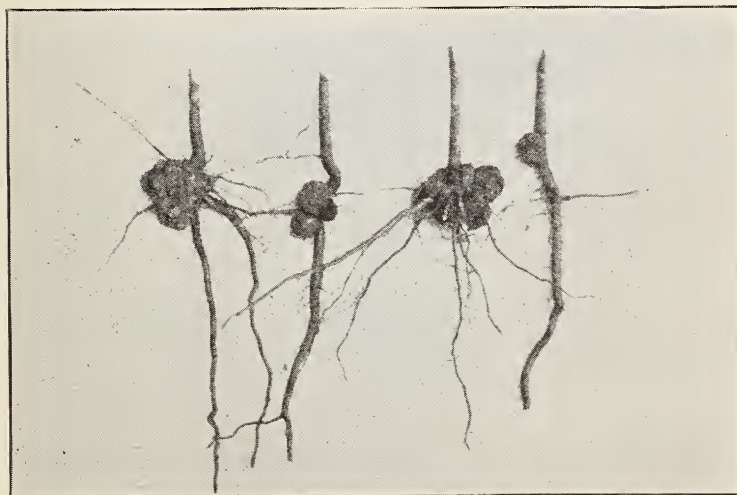
Dissolve the soap in the water and away from the fire pour in the kerosene and churn with the spray pump for ten minutes. The mixture becomes milky in appearance and is jelly-like when cool. Dilute ten times.

Kerosene Water Mechanical Mixture.

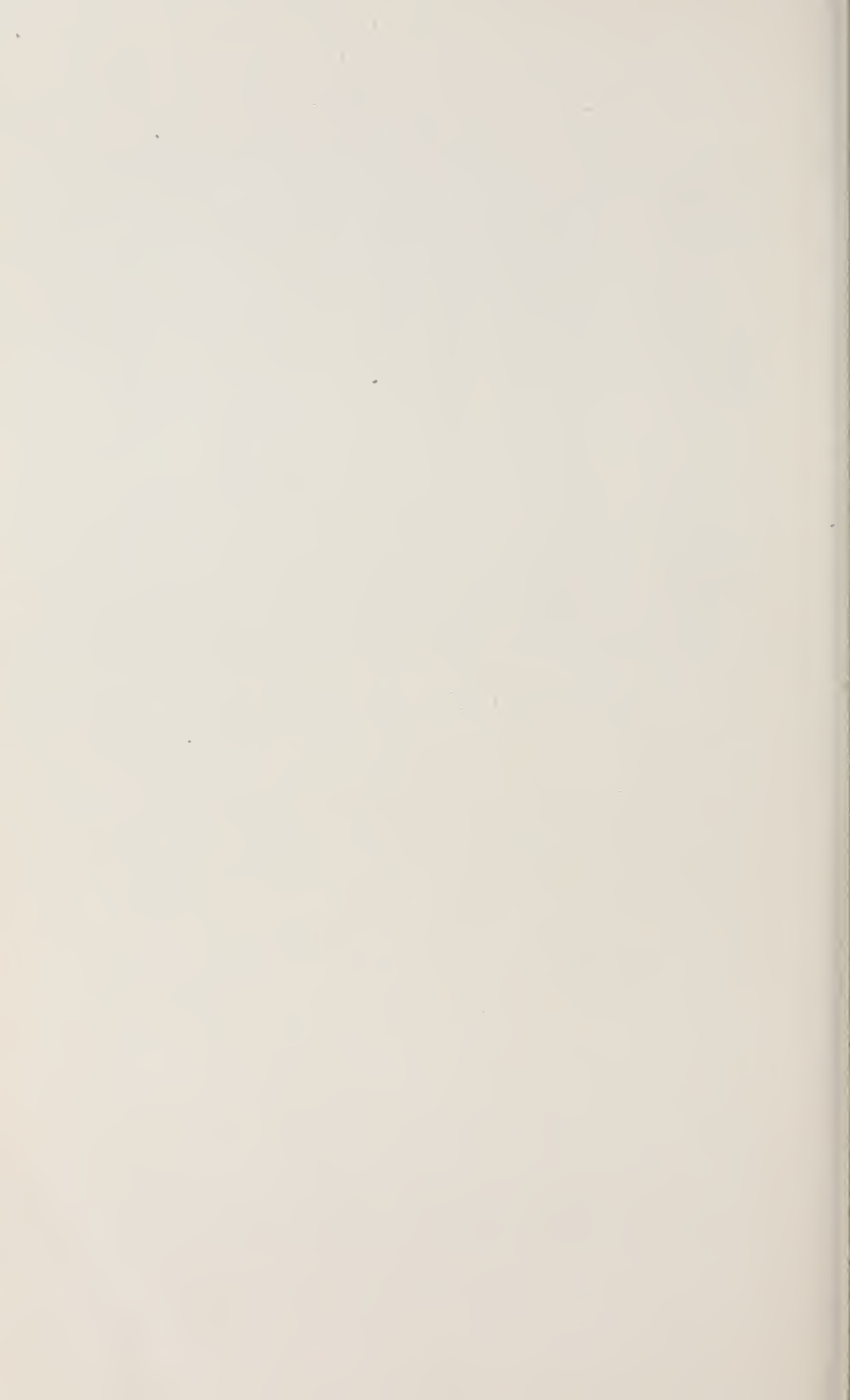
Kerosene is fatal to all insects but is also very injurious to plant life. Kerosene and water must be applied with pumps specially constructed for the purpose. Pumps with kerosene attachments can be procured from the Deming Co., Salem, Ohio; Goulds Co., Seneca Falls, N. Y., and Spray Motor Co., London, Ontario. Kerosene mechanically mixed may be used for all purposes for which kerosene emulsion is suitable. Any percentage of kerosene desired may be used in the attachment. Ten to twenty per cent may be used ordinarily with safety.



Anthrachnose of the apple. From 1900 Oregon Report Board Horticulture.

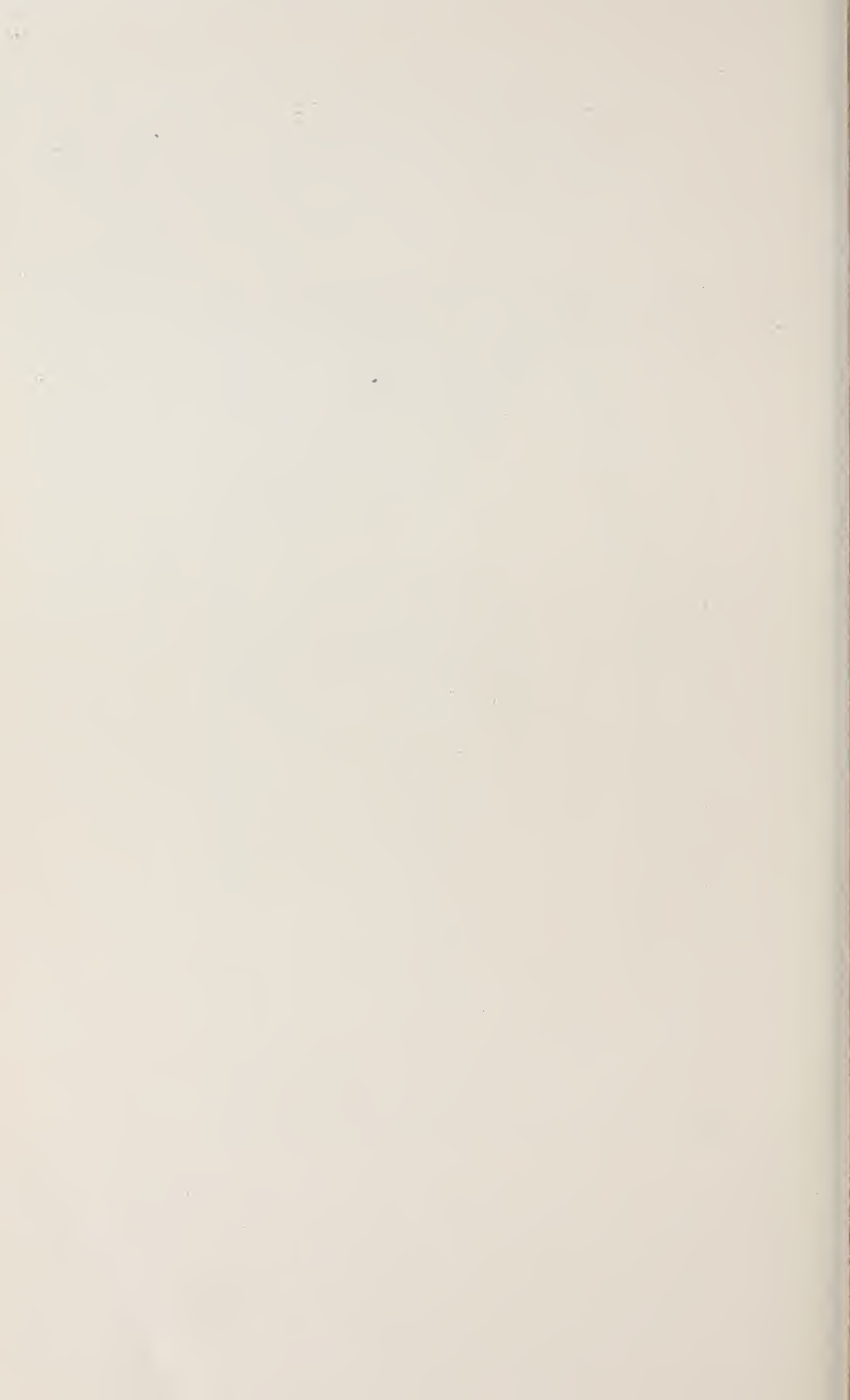


Crown Gall. Arizona Experiment Station.





San Jose Scale. From U. S. Department of Agriculture.



Sulphur—One ounce of sulphur to one gallon of water is effective against red spider.

Whale Oil Soap—Whale oil soap, one pound; water, six gallons.

Whale oil soap costs about five cents per pound. It is valuable for use against plant lice in some instances where kerosene fails.

Formalin—In greenhouses on roses affected with root nematodes. After a thorough watering of the plants soak the beds with a mixture of one part commercial formalin to one hundred and twenty-five parts water. Repeat the operation at the end of three weeks.

Sulphur, Lime and Salt—This is a winter spray and used for all scale insects, pear leaf blister mite, green aphid, twig borer, bud moth and clover mite.

How Prepared.

Ingredients—Lime (unslacked), fifty pounds; sulphur, fifty pounds; stock salt, fifty pounds. This will make one hundred and fifty gallons of wash.

Directions—Slack fifty pounds of lime, then add the fifty pounds of sulphur, boil it over a brisk fire for one hour, then place all the salt with it in the boiler and boil for fifteen minutes more, then add the necessary water to make one hundred and fifty gallons. This solution should be used at a temperature of at least 100 degrees. Before using, strain it. The utility of this wash depends a great deal upon the strength of the sulphur. It is therefore recommended that those who use this wash have a Beaumes scale for acid. When it shows 8 degrees when cold, it is of the proper strength. These scales can be obtained through any druggist at a cost not to exceed fifty cents.

This combination is the result of Mr. Emile Schanno's extensive experiments in the fourth district. From 1900 report of Oregon State Board of Horticulture.

Bordeaux Mixture, Fungicides, Formula—All things considered, it is believed that the best results will be obtained from the use of what is known as the fifty-gallon formula of this preparation, as follows :

Ingredients—Water, fifty gallons; copper sulphate, six pounds; unslacked lime, four pounds.

Must be well made—It has been found that the method of combining the ingredients has an important bearing on both the chemical composition and physical structure of the mixture. For example, if the copper sulphate is dissolved in a small quantity of

water and the lime milk diluted to a limited extent only, there results, when these materials are brought together, a thick mixture, having strikingly different characters from one made by pouring together weak solutions of lime and copper sulphate. It is true, furthermore, that if the copper sulphates solution and lime milk are poured together while the latter, or both, are warm, different effects are obtained than if both solutions are cool at the moment of mixing. Where the mixture has been properly made there is scarcely any settling after an hour, while the improperly made mixture has settled more than half.

How to make it—Briefly, the best results have been obtained from the use of the bordeaux mixture, made in accordance with the following directions: In a barrel, or other suitable vessel, place twenty-five gallons of water; weigh out six pounds of copper sulphate, then tie the same in a piece of coarse gunnysack and suspend it just beneath the surface of the water. By tying the bag to a stick laid across the top of the barrel no further attention will be required. In another vessel slack four pounds of lime, using care in order to obtain a smooth paste, free from grit and small lumps. To accomplish this it is best to place the lime in an ordinary water pail and add only a small quantity of water at first, say a quart or a quart and a half. When the lime begins to crack and crumble and the water to disappear add another quart or more, exercising care that the lime at no time gets too dry. Toward the last considerable water will be required, but, if added carefully and slowly, a perfectly smooth paste will be obtained, provided, of course, the lime is of good quality. When the lime is slacked add sufficient water to the paste to bring the whole up to twenty-five gallons. When the copper sulphate is entirely dissolved and the lime is cool, pour the lime milk and copper sulphate solution slowly together into a barrel holding fifty gallons. The milk of lime should be thoroughly stirred before pouring. The method described insures good mixing, but to complete this work the barrel of liquid should receive a final stirring for at least three minutes with a broad wooden paddle.

Potassium Sulphide—Potassium sulphide, one ounce; water, two and a half gallons.

For use in greenhouses against chrysanthemum rust and rust of the carnation where bordeaux mixture cannot be used. Will not discolor the foliage. Dissolve the sulphide in a quart of hot water and add requisite amount of cold water.

Varieties in Montana Apples.

When the pioneers in Montana orcharding first planted apple trees they had no means of knowing what varieties, if any, would grow and succeed here. They naturally first planted those old varieties that they knew in the eastern states, such as Baldwin, King, Belleflower, Greenery and dozens of others.

Many of these proved too tender for the hard winters of those days and hardier kinds were sought and found in such Russians as Duchess, Red Astrachan and Alexander, and also some of the new seedlings from the northern belt of fruit-growing states, as Wealthy, Scott's Winter, Pewaukee, Walbridge, etc.

Then came a host of the newly imported Russians for trial, most of which proved of little value, though a few are good and will stay with us. Those proven desirable are Antonovka, Boiken, Yellow Transparent, Gravenstiven and one or two others.

Still trying to find the perfect apple we have of late been trying some of the Missouri and Arkansas favorites, such as Gano, M. B. Twig, Black Ben Davis, Shackleford, Senator, etc.

Thus it is that in nearly every orchard in Ravalli and Missoula counties there a great many more varieties than there should be, either for pleasure or profit. It would be far better for the grower if he had only one or two kinds for each season of ripening, and there is no excuse for those now planting orchards repeating the blunder of those who set the earlire orchards. While the perfect apple has not yet been found for each season, it is very easy to discard a large portion of those we now have as of less value than others.

It is not necessary to cut down or dig up the inferior kinds, but by top-grafting they may be changed in three or four years into bearing the best fruit we have.

As to varieties that have been tried and proven to be best are the following: Yellow Transparent is the earliest, first-class apple we have ripe in August, fine in appearance and flavor, tender in flesh, but a poor shipper. If it could be got in the markets as fine as it comes from the tree when fully ripe, the demand for it would be unlimited.

For September we have the Duchess, and we need no other, for it is about perfect in every way, hardy, productive, large, beautiful and good both for eating and cooking.

The Wealthy and Alexander fill the bill for October and November.

The Wealthy is bright red, a beautiful apple, juicy and high-flavored and a universal favorite with the consumer. It has the fault of over-bearing and thus growing too small and of dropping from the tree.

The Alexander, while not as pretty or of so good quality, is very large, and its size will always find it a market.

But now as we approach the winter season we find ourselves on debatable ground. Some of the very best of our winter apples are small in size, but their fine eating qualities find them a ready sale. In this class are Snow, Jonathan, Grimes' Golden, etc.

The Antonovka, a large yellow Russian, is popular where known, and will always be one of our standard winter apples, while Red McIntosh is nearly perfect for December and January. For the spring months we have as yet no one or two varieties that are entirely satisfactory, but several do fairly well, such as Gano, Walbridge, Northern Spy, Boiken, Ben Davis, etc. We should select the best of these and discard the rest for—in apples—in numbers of varieties lies weakness. Better have all of any one or two than a dozen or more.

It is but a very few years since a few hundred boxes was the total output of all our Montana orchards. Now we produce hundreds of thousands of boxes and we are just at the threshnoid or orcharding in the state.

The Montana apple is beautiful in appearance and high in quality. It is absolutely clean and free from worms or other disgusting pests, and there is no reason why it should not be produced in increasing quantities and it should and will find a world-wide market.

W. B. HARLAN.

Como, Mont., December, 1902.

Fruit Culture in the Milk River Valley.

There is not the amount of attention being shown the matter of fruit culture in this valley as one would expect.

As a rule the farms are too large to permit of much attention being given to small crops; then the production of beef and mutton; with our practically unlimited range, and mild open winters, seemingly has more attraction to our farmers than fruit culture at the present time; besides it is only very recently that irrigation has been put into successful practice, the first canal having been constructed in 1894, and up to the present time it has kept our farmers busy getting their land in shape to produce crops.

Notwithstanding these facts, within the past three or four years considerable attention has been given to fruit growing, and one agent representing an eastern firm who operated in this valley last year informed parties in the valley that he had sold \$14,000 worth of nursery stock. Unfortunately the greater part of this died out, as would have been expected by an experienced person, and it is a surprise to me that our Montana nurserymen have overlooked this profitable field so long.

The success attained has been by persons with comparatively small farms, who had the time and inclination to properly care for their orchards, but many of our first settlers have now got their farms in first-class condition, have built themselves modern homes and have settled down for the balance of their days. These, as a rule, are now giving considerable attention to the starting of orchards, and results will be manifest in a few years, especially so if they are furnished with reliable acclimated stock.

At first attention was given to the culture of small fruits and it was found that the valley was the natural home of the strawberry; raspberries, gooseberries, blackberries have also done well in the Bear Paw mountains. Much small fruit is now being grown, the principal varieties being in strawberries the Wilson, Warfield and Vandeman; in raspberries the Gregg, Cuthbert and Marlborro.

Grapes have also been grown for several years, the Janesville, Worden and some report the Concord. The leader in grape culture is Mr. Rudolph Hermis, of Chinook, who was first to grow them successfully.

Mr. C. M. Sedgewick, living sixteen miles south of Chinook, near the Bear Paw mountains, has been producing the berries successfully for several years and supplying the Chinook market.

Mr. Sedgewick has also been successful with native improved plums and hardy apples. I have not been able to learn of the variety of apples grown.

Mr. Peter Denny, near the town of Chinook, has had remarkable success with plums, the Weaver, Desota, Hawkeye and several others, also with apples, the Wealthy and several others of that sort. These trees on Mr. Denny's place have only been set out four years, but have had a remarkable showing, as will be seen by accompanying photographs.

Mr. William Hulbush, living three miles east of Chinook, has a good sized orchard set out this year. Mr. Harry Reynolds, Mr. Ed. Martin, Rudolph Hermis, Henry Kramer, all living near Chinook, are giving considerable attention to fruit culture.

Last spring the Montana Experimental Station, at the suggestion of Director Fortier, sent the writer a dozen native grown apple trees for experimental purposes. It was first proposed to plant these at Hinsdale, but it was finally decided to plant them at the "Anchorage," as the home place of W. M. Wooldridge is known, and which is located three and one-half miles east of Hinsdale. Some difficulty was experienced incident to rush of work on the farm in getting them set out promptly. Among the varieties were the Gano, Pepin, Wealthy, Duchess, Ben Davis and two or three other varieties. These trees have done well the past season and indications are at the present time will make a good growth.

The Great Northern Railway Company has established a demonstrative or experimental station at Hinsdale to prove to new settlers just what the land will produce, with the aid of irrigation. In this they have planted the small berries already mentioned, including tame currants, a considerable quantity of which is now being produced throughout the entire valley. In this experimental garden there were planted last year several plants each of the following variety of grapes: Concord, Worden, Janesville and Niagara. During the present season nearly all of these bore one or more bunches of well matured grapes, and there is every indication of the Milk River Valley becoming noted as a great grape-producing section.

At Hinsdale also the Great Northern Railway has established quite an extensive park surrounding the depot. Besides having it well seeded to lawn grasses the following flowering shrubs have been planted and have during the past season produced a profusion of bloom: Hardy American Beauty roses, lilacs, snow balls, hydreangeas. There has also been set out a considerable number

of cottonwood shade trees, which have done well. The flowering shrubs previously mentioned are mainly set out in beds in the center of each small park, of which there are three, and bedding plants of potted geraniums, phlox, petunias, pinks are grouped around, with beds of pansies along the north side of the station.

We have several native plants worthy of cultivation in the home grounds. Among others might be mentioned the yellow flowering currant, found in our woods, the wild cherry, which has a great wealth of very fragrant blossoms during the spring months, and for this alone should receive a place in every home ground. Then their fruit affords food for the birds, which should cluster around every home. We also have the wild hop, which makes a beautiful covering for arbors and walls.

I cannot close this article without some reference to attracting the song birds about the home. Usually on the prairie very few of our many pretty song friends will remain around the home, but as soon as a grove of shade trees have been planted and have reached sufficient size to afford protection from their natural enemies, the song birds will begin to congregate around, especially if a friendly disposition is manifested by the occupants of the home. Throughout the Milk River Valley are to be found many different species of song birds, not noticeable in many other sections of Montana, and we well remember being impressed by this fact when first coming here from the mountain regions of the state, where blue-jays, crows, blackbirds and a few small songsters were the only noticeable ones. When we arrived here in 1888 our attention was called to the many hundreds of meadow larks, blue birds, woodpeckers, cat birds, wrens, skylarks and other birds which we had not noticed in our mountain home. On our broad prairies the meadow lark is the first arrival and is a welcome herald of spring. During the summer months he can be heard at any hour of the night singing. This is a peculiar feature, the singing of the meadow lark at night, but as a rule our summer evenings are light and warm and it is a fact that dozens of larks will be heard at any hour of the night, so much so that persons of a nervous temperament sleeping out on the prairie will be disturbed by their song. The meadow lark is the very last songster to leave in the fall, and we noticed one lone lark still lingering with us long after our first snow last fall.

The observation of the Buffalo berry as being adapted for hedges around home grounds and for fencing generally has further convinced your correspondent that in that plant we have a very

valuable plant for that purpose. The small hedge of these plants on the place of Mr. John Matheson, six miles east of Chinook, is doing all that the most hopeful could desire, and I regret exceedingly that I am unable to send you a photograph of the same that you might use it in illustrating your report.

In native shade trees, the varieties seemingly best adapted are the native broad leaf cottonwood. One of the principal objections offered against the cottonwood tree for shade or lawn purposes is the objection to the cotton falling from it at certain seasons of the year, but it is a singular fact that the majority of the cottonwoods found along Milk River Valley are of the male sex and are free from this objection. It is rather a rare occurrence to note a cottonwood with cotton.

The green ash is a native of the eastern end of the valley and makes a very pretty shade tree. Small groves of ash are to be found in many small gulches, seemingly where they receive some protection from prairie fires which in the past have been very destructive to all native trees, but which, owing to the rapid settlement of the valley, is not quite so common as heretofore.

North of Hinsdale, some fifteen miles on a branch of Rock creek, are found considerable quantities of bad land cedars. Many of our farmers have cut these for fence posts and they have proven much more durable than the imported cedar posts.

Another tree which is found in many parts of the valley and some of which have reached enormous size, is the box elder, but most of these have been ruined by prairie fires previous to settlement by the white people, and I have not yet seen a well-preserved specimen.

The American elm is found in all its splendor near the eastern Montana state line along the Missouri river bottoms. Senator Gibson has experimented a great deal with this tree in the vicinity of Great Falls and has proven its adaptability for that locality. We believe that it will thrive and do well wherever irrigation is practiced.

We have a number of varieties of the willow family, the most common being what is locally known as the Diamond willow, from the peculiar formation and wounds where old branches have died out, and which are made into canes and sell at fancy prices. So common are these willows that they afford excellent shelter for cattle and horses during heavy storms, growing as they do very thick along the bottoms and interlacing at the top.

The Carolina poplar has been advocated as a shade tree for this section and has been tried by many, but the result has not been gratifying and I doubt their adaptability to the valley.

W. M. WOOLDRIDGE,
Inspector Third District.

Hinsdale, Valley County, Mont.

The Boulevarding and Tree Planting of Great Falls, Mont.

To Hon. C. H. Edwards,

Secretary Montana State Board of Horticulture, Butte, Mont.

The city of Great Falls is beautifully laid out with twelve avenues on each side of Central avenue and thirty-eight streets on the east side of the Missouri river; besides this we have the west side, in all 167 miles of platted streets. The blocks contain fourteen lots, 50x150 feet, carefully surveyed, and the streets are 80 feet in width. On residence streets the roadway is 34 feet between curbs, the sidewalk is bordered on each side with grass plots 9 feet in width; with a row of trees in the center of each plot, the sidewalk being 5 1-3 feet in width, making a total of 23 feet between the property owner's lawn and the roadway.

In the spring of 1898 Fourth avenue north had 700 elm and cottonwood trees set. About 25 of the elm and 150 of the cottonwood died. In the fall of 1900 Third avenue north was set to 600 elm and ash trees; only 13 of these trees died. In the spring of 1901 Fifth avenue south was set to elm and ash and about 75 of these trees died owing to their being too long on the road in transportation; they were partially leaved out when received. In the fall of 1901 Fifth avenue north was set to 700 elm and ash trees and in June of 1902 they were all alive, but about 15 of these have died since owing to lack of proper care. In the spring of 1902 286 elm and ash trees were set on the extension of Third avenue north and in the middle of the summer only two of these were dead. In the spring of 1902 Eighth avenue south was set to 486 elm and ash trees and about 25 of these died owing to their being kept several weeks in the warehouse without dirt on the roots and not set until about the 20th of June. There have been over 400 elm and ash trees set on the cross streets.

The city has decided to set about 2,000 elm and ash trees on Sixth and Seventh avenues north this fall and, with these avenues completed, the city will have about nine miles of boulevarded streets and about 5,225 shade trees. We have found that the elm and ash trees give better satisfaction, as a rule, than the box elder and cottonwood, and I believe that the trees growing on the boulevards in Great Falls are as healthy and thrifty as can be found growing in any part of the United States.

If the present system of tree planting is continued the area within the 167 miles of platted streets will accommodate 80,000 trees. Besides this there will be several thousand trees in the parks and in private lawns. The park committee intend to experi-

ment on other varieties of hardwood trees and I expect they will find several varieties that will be well adapted to this country.

Anyone who does not think that a hardy variety of trees can be grown here should take the time and trouble to see the city nursery and be convinced. Here we have 10,000 elm, 9,000 ash and 1,000 maple trees, making a total of 20,000 trees, which are as thrifty as can be found anywhere. These trees were all grown from seeds.

Five years ago last spring the first elm tree seeds were planted and from these seeds we now have beautiful trees ten to twelve feet high and from one to two inches in diameter at the butt.

It seems to me more interest should be taken in the maple. Although perhaps not quite so hardy as the elm and ash, it is a very pretty tree and is not so much infected with tree pests as the elm. It has been well demonstrated that it can be grown here with good care.

There has been expended a large sum of money in beautifying the city, viz: From January 1, 1901, to January 1, 1902, there was \$21,306 expended in grading, curbing, seeding to grass and setting out trees on the newly boulevarded streets, and from January 1, 1902, to January 1, 1903, work of this character will amount to nearly \$45,000.

From January 1, 1901, to January 1, 1902, there was \$6,000 expended on unimproved streets in laying sidewalks, etc., and in the same time in cleaning and general maintenance of streets there was \$10,000 expended.

Very Respectfully,

C. E. HUBBARD,
Inspector Third District.

Fruits in Montana.

It is not possible in this report to attempt a detailed account of all the various varieties of the many different fruits grown within our state. Indeed, it would require a large volume to do this, as the varieties are almost too numerous to mention.

During the early commencement of fruit culture everything was an experiment. The planter naturally concluded that the wider and more numerous the varieties tried the quicker could desired results be attained, and accordingly we find Montana orchards abounding with many varieties of fruits entirely unadapted to the state, unfit for market and certainly unprofitable.

This condition is not to be wondered at. It is but a natural result, when we consider the conditions which the early planter had to contend with. Migrating from all parts of the United States, from localities where conditions were well established, bringing with him the knowledge and experience of those localities, it was natural for him to attempt to grow first those plants with which he was most acquainted. He had no opportunity to compare notes; his neighbor was as ignorant of conditions as himself and all he could do was to plunge into an almost unknown field and plant at random, trusting to luck and experience to bring him success. To these early pioneers we owe what success has been gained in the field of horticulture and to them we should give praise for the great work done.

But present conditions are widely different. Today the intending planter can seek for knowledge and find it. He can seek among the orchards and gardens; learn for himself the best varieties that we now grow; visit the markets to study the demands; learn of the better methods of producing and caring for fruit—in fact his path is made much more easy and sure. He enters into the work, through careful observations, with the experience of twenty-five years along horticultural lines.

Yet it is no easy task after all to determine, after all these years of experimental work, what are the best varieties of each fruit for planting. Here enters the question of demands of market, conditions of soil and locality, all of which must be studied carefully. This, of course, can be done by visiting the orchards in the vicinities where planting is intended.

In the work of successfully growing the small fruits, such as strawberries, raspberries, blackberries, currants and gooseberries, the planter is not confronted with so serious a matter as to the best varieties. Of course we are not to be understood as saying

that no experience in selection of varieties is needed in the matter, but it is generally easier to be able to determine along the small fruit line than in the matter of tree fruits. The small fruits may be planted and grown, generally speaking, with success in every portion of our state. Indeed, we can truthfully say that no portion of the United States offers more favorable conditions for the bush and vine fruits than is to be found in Montana, and the profits realized here from intelligent efforts are generally larger than can be made in other states. But it is to select the best varieties of apple and pear for commercial planting that we find our chief trouble. There are so many points to be decided upon. We can easily find varieties that produce well, that are good lookers, that have good eating and cooking qualities, but then we find them lacking in keeping qualities, and when we find them possessing the keeping qualities, we also find that they are minus the looks and selling qualities, and there we stick. Now as we have before said locality, climate and markets must be studied and for this reason it is deemed unwise for us to herein attempt to name varieties best adapted to Montana at this time. All that can be safely done is to show by illustrations some of the late varieties grown, and the planter must then study his market demands and local conditions and decide for himself. In this connection we might say that from the varieties illustrated in this report a good commercial orchard may be selected without fear as to its future value.

It should always be borne in mind by the intending planter that quantity has a good deal to do with the matter of profits in orcharding. By this we mean that in planting one should have the courage to confine his choice to a few varieties, not fearing that unless he has this and the other variety he might have a total failure, and thus be able to ship straight car loads of one variety, or at least car loads made up of not more than two or three varieties. The orchardist who can fill an order for a straight car load of a poor variety of apples or pears demands a better market than he who can furnish a mixed car of the better sorts. Then again there is an advantage in the matter of selection and also in the treatment of the trees. Elsewhere in this report will be found the selection of varieties made by the growers and reported to this office by orchard inspectors. This list does not, however, give all the varieties grown, but merely the choice of the grower, which we deem is of more value.

While the apple leads all other fruits in the state, forming 80

per cent of our commercial fruits, pears, prunes, plums, apricots and cherries are grown with equal success. Peaches and grapes are also grown in many localities, but do not as yet form any part in the commercial line of our products.

The crab apple has lately jumped forward into prominence as an export fruit with us. Montana seems peculiarly adapted to the profitable cultivation of the crab apple. The trees are quite hardy and seem to thrive upon poorer soil and with more neglect than with the apple and will be found profitable in all parts of the state. The demand for the best varieties of crab apples is good and seems to increase. We supply several car loads each year to Manitoba, and the cities of the Dakotas are calling for more than we can supply. For cider-making crab apples are especially valuable, the cider made therefrom being better and of more body than that made from apples, and for jellies and preserving they have no value.

The varieties most in demand are Transcendent for early and Hyslop for late. There are other kinds that are good, but not so popular, such as Florence for extra early, a beautiful colored crab apple of fine quality, Martha, some later than the Transcendent, which is a fine cooker and keeps well. The Whitney is more apple than crab, a popular fruit for dessert and for children's use, but of short season and soon too mellow. The tree is extremely hardy and would be one to set in such localities as are too cold for most other varieties and would there supply the demand for both apple and crab. The yellow or orange crab is of no value and not worth planting. There are a dozen other kinds, but not valuable for general planting.

